

Doorway, Bristol, Rhode Island, about 1800. (Courtesy Metropolitan Museum of Art.)

PLANNING
the
LITTLE HOUSE

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Preface

“TASTE—critical judgment, discernment—is the most delicate fruit of learning and grows at the top of the tree. It can hardly be acquired in a draughting-room or a parlor and it is not, as is often supposed, the peculiar inheritance of gentle blood. It is the result only of study and critical observation.”—From *The Story of Architecture in America* by Thomas E. Tallmadge, W. W. Norton & Company, Inc., New York.

The course for which this book was written is devoted to the study of the small house. The subject matter covered may be divided into four major parts: the use of space, good taste in exterior design, the historic background of the American house of today, and its construction and equipment.

The development of good taste presents a delicate problem. It implies that there is room for improvement, doing violence to a notion we all cherish: that our own taste is naturally perfect. The truth is that even naturally good taste can be improved by cultivation, or what Mr. Tallmadge calls critical observation.

The advancement of good taste involves the substitution of detached judgment for emotional reactions. Instead of saying, “I like that house,” or “I don’t like this one,” critical observation enables the student to speak of houses in terms of unity, balance, proportion, structural integrity, and honest use of materials.

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The first part of the book presents a series of problems in drawing plans and elevations of houses; the second part contains information that should be used in their execution. The suggestions for study at the end of each chapter in the first part are also designed to tie these two parts together.

The exercises in the text call for no talent or technical training, for every line of the drawings may be made with a ruler. They are intended to provide the average person with a means of expressing his own ideas on the planning and design of a house. The book is based upon the belief that one learns by doing; that actually drawing plans and elevations means more than endless discussion and reading on what a house should be. Drawing one or two plans is hardly enough; it is only after repeated essays in space arrangement that a sound judgment in regard to the planning and design of houses is developed. The full possibilities of these problems may not be realized by drawing just any plans, exactly like the houses that have been built by the thousand in the past, but by striving always to produce a better plan: one that makes a more economical and convenient use of space and presents a more attractive setting for modern family life. Typical small-house arrangements are used as the bases of many of the exercises, for they save time that would otherwise be wasted floundering about with an impracticable plan, and they form the starting point for later excursions into more unusual and difficult problems.

Although the construction, materials, and equipment of a house are highly specialized fields requiring the services of experts, a general knowledge of these subjects will help the layman understand the work of the builder, plumber, heating engineer, and electrician.

For those who will some day face the problem of building a house, the practical benefits of a course in house planning are obvious. But even if one never builds a house, the study of a subject so closely related to life will not be wasted, for it widens the cultural horizon and opens a new field for interest and enjoyment.

The author wishes to thank Genevieve Fisher, Dean of the Home Economics Division, Iowa State College, and Joanne Hansen, Head of

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the Applied Art Department, for the help and encouragement they have given. Thanks are also due Kathleen Robertson, of the editorial staff of *McCall's* magazine, for reading and criticizing the manuscript; Warren Roberts, upon whose experience in designing and building houses the author has freely drawn; Dr. Louise Peet, head of the Household Equipment Department, for suggestions on the chapters on kitchen planning, heating, and lighting; and the members of the Applied Art Department, who have cooperated in developing the material used in the house-planning course.

ALICE WAUGH.

AMES, IOWA,
January, 1939.

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Foreword

EMPHASIS upon the importance of finer family relationship in human development is a recognized part in all areas of modern education. A house that is well built and well planned in accordance with family needs makes a definite contribution to the ease, comfort, and happiness of daily living. Answering the demand for a book on house planning, Miss Waugh has in this text presented the fundamental principles for guidance in a nontechnical study of the small house.

The majority of home economics students are potential homemakers. As such, they need to be able to interpret blueprints of house plans and to design small houses of moderate cost, so that they may more clearly visualize the problems involved in house design and be better able to cope with them.

At Iowa State College, the course in house planning is required of all home economics students and is taught in the Applied Art Department. In the classroom, a study of the traditional styles in home building and of European influences in present-day design assists in developing aesthetic appreciation. The modern house with its simple masses and entire lack of applied decoration makes almost as great an appeal to the youth of today as do the streamlined car models. A keen interest in exterior design is aroused by visits to houses being remodeled or under construction. Ideals of simplicity,

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fine proportion, and directness are formed through the study of fine examples of domestic architecture. The arrangement of rooms and equipment with reference to ease of work, furniture placement, and many other important considerations are discussed and worked out in the exercises as they are given in this book.

Miss Waugh has brought together the material used by the Applied Art Department in the house planning course, illustrated it fully, and expanded it to its present book form, making a real contribution to the study of the small house. All the material has been tested in classes over a number of years and has proved adequate to the objectives of the course. These objectives include the development of students' interests and of aesthetic appreciation and ideals, and the ability to use effectively the art elements and design principles in the planning of small houses. Among the ideals are good functional and structural design, simplicity, directness, fine proportion, dignity, and beauty.

Through practical problems requiring judgment, the student gains discrimination. The book as a whole is planned to encourage independent thinking and guide the students to express their own ideas in a simple and logical manner. The selection of problems, their careful arrangement according to difficulty, and well-chosen illustrative plates assist in meeting the objectives of the course.

The book is not intended to prepare students to design their own houses without the help of an architect, but rather to prepare them to cooperate with him when they build a house. The exercises in the text are planned to develop in them a greater appreciation of the importance of retaining an architect, whose ability to design a house is based upon years of training and experience.

JOANNE M. HANSEN.

AMES, IOWA,
January, 1939.

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The Problem of Good Taste

A WALK through the streets of almost any town makes us realize that there are too many ugly houses in the world. The people who built these ugly houses, however, must have liked them. At least it seems improbable that anyone would deliberately put up what he considered an ugly house. The trouble is that people have such different ideas of beauty. The new house that makes its owner's heart swell with pride may be the cause of much quiet suffering to his neighbor. Who is to say which one of them has better taste? Personal preferences certainly have a right to be considered.

Then, too, ideas of beauty have changed with the years. There have been fashions in houses, just as in clothing. The quiet New England farmhouse must have looked bare and barnlike to our Victorian grandparents when they built their "Gothic villas" and other strange creations, festooned with gingerbread trimming and surmounted by turnip-shaped cupolas. Some years later, the squat bungalow with its enormous roof and bulky cobblestone porches satisfied the eye of the early twentieth century. Both these styles seem ugly today, but how do we know that our taste is any better than that of our grandparents? We feel sure that we are right and they were wrong but perhaps the houses we are building today with the best intentions in the world will make a later generation laugh.

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Personal taste and transient fashions alone, therefore, form an insecure foundation for the choice of so permanent and expensive a thing as a house. The individual's taste may be bad, or undeveloped. The house he would choose in his youth might not satisfy his more mature and sophisticated judgment. The very essence of fashion is change. A dress or a hat or a house that is in the height of style this year, next year will, doubtless, be conspicuously old style. How, then, can we be sure that our present ideas of beauty will not turn out to be short-lived fads, like Eugenie hats and hoop skirts?

Fortunately, we have three dependable guides to conduct us through the complex problem of house design. The first of these is the work of the leading architects of the present day. They have spent years in the study of architectural design, and in addition have had practical experience in planning and supervising the building of houses. Naturally, they know more about houses than other people can expect to know; and fortunately, the results of their work are available in books and magazines devoted to the building and furnishing of houses. It may not be possible to employ the best-known architect in the country to design a small five-room cottage, but it is a comparatively simple matter to study the work he has done for others.

Second among the guides mentioned above are the magazines and books about houses—the houses of the past in this and in other countries. There is no better background for the development of taste than an understanding of the historic styles. The study and analysis of house designs that, after centuries, are still pleasing to the eye, will afford a long perspective on modern fashions in domestic architecture. This does not mean that every house today should be an exact and literal copy of some structure built long ago. A skillful designer is able to create many original and beautiful variations on architectural themes taken from the past. And, indeed, it is possible to design a beautiful house that does not follow any style. Most people, however, if they do not choose a “modern” design, prefer to follow one or another of the historic styles. When a house is built, the owner must decide whether it is to resemble the houses of colonial America, or

England, or France, or the Mediterranean countries. With a wealth of material at hand in books and magazines, no one need be in doubt about any details of the style he has chosen.

The first two guides mentioned imply a dependence for one's taste upon others, either the builders of long ago or the architects of today. Such dependence can scarcely be avoided; the layman must receive most of his ideas on houses secondhand, just as he receives his medical and legal ideas secondhand from his doctor and his lawyer. But he need not be entirely dependent; a sound judgment in matters of taste may be acquired by any intelligent person who takes the trouble to study the principles of design. Anyone who possesses this judgment will have at his command all three of the valuable guides.

The benefits of such study may be mentioned briefly. A knowledge of design is an essential part of general culture, and it opens to its possessor a wide field of enjoyment and interest. Then there is a practical advantage; the client who understands the principles of design is able to meet his architect halfway, saving time and avoiding disagreements.

Beauty is too elusive to be pinned down with formulas and rules. The best one can do is to work for those qualities of design that may be described, however imperfectly. Through centuries of experience man has discovered that designs made according to certain principles are pleasing to the eye. These principles are orderly arrangement, unity, proportion, balance, and rhythm. Through their use the designer achieves that fundamental rightness of spatial relationships that will endure through the rise and fall of many popular fads.

Orderly arrangement is a rather general term. It implies a well-considered neatness in the assembling of the parts of a design. It is of especial importance in the design of a house, for it helps to produce a feeling of strength and permanence. Order is destroyed by hit-or-miss window arrangement, many different roof slants, ill-chosen mixtures of materials, and poorly placed decoration. Simplicity, both of idea and of execution, is one of the greatest aids in achieving order. In a larger sense, order is the result of the use of the other design prin-

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ciples; that is, balance, unity, and proportion all contribute to the orderly quality of a design.

Unity may be described as a feeling of oneness—all the parts of a design in agreement with one another and with the whole. Con-



FIG. 1A.—Unity is lacking because the house is divided into two equal parts.

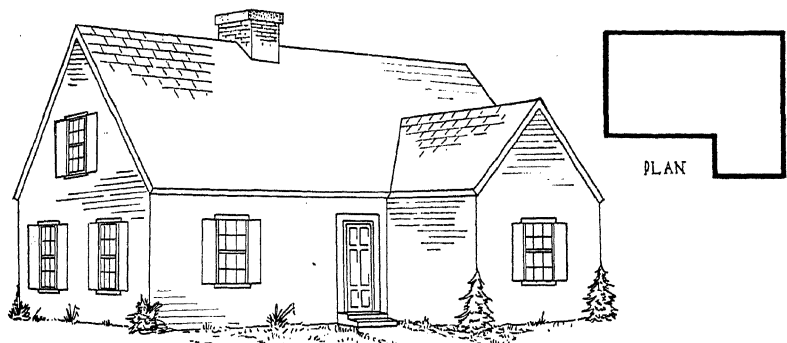


FIG. 1B.—This house possesses unity by dominance of the main mass over the subordinate extension.

sistency in the treatment of details, a simple use of color, and—most important of all—dominance of the main mass, contribute to the unified appearance of a house. The last-named quality, dominance, may be attained or lost in the plan. An example may be found in the L-shaped house. If the two parts of the plan are of equal height and

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size, they are likely to be of equal importance in the design of the exterior. In Fig. 1, Plan A, with two equal parts, produces a design that lacks unity. Since the two arms of the L are the same size, neither one is dominant over the other. The two parts pull attention in opposite directions, destroying the effect of oneness. Plan B shows how this fault may be corrected. The two arms of the L are unequal in size, and the resulting design possesses unity by reason of the dominance of the larger mass over the smaller one. Figure 2 shows a commonly used design in which the central mass dominates the two

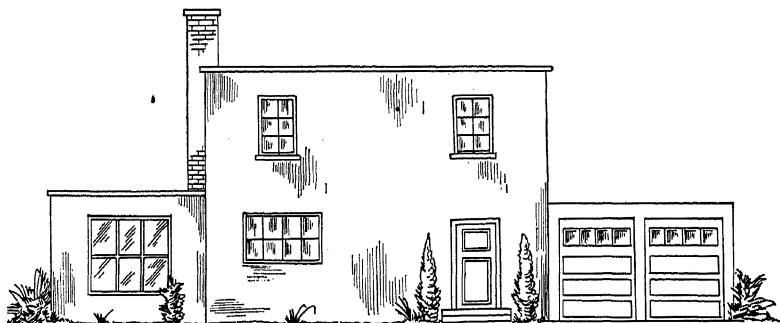


FIG. 2.—Unity by dominance of the central mass.

smaller side masses. In addition to being smaller, wings at the side should have simpler treatment than the central mass.

Prominent porches and large dormers also offend against unity. Everyone has seen little houses hiding behind massive front porches. The story-and-a-half house frequently suffers from a huge gable built on for the sake of additional space upstairs. The general effect is that of a large nose on a small face. By attracting attention away from the main mass, the oversize gable destroys unity.

Unity of design suffers, as well, from an indiscriminate mixing of materials. A very large, rambling house with many wings and projections may successfully combine stone, brick, and half-timber work, but in a small house such a mixture is likely to suggest a patchwork quilt. If more than one exterior finish must be used, the house may be pulled together by being painted all one color.

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Proportion is a matter of relative sizes. Major proportions of height and width, of roof and wall area, should present an interesting variety in sizes and space divisions, rather than a monotonous repetition of the same dimensions. Thus, an oblong is better than a square for the façade of a house, and unequal areas of roof and wall are more pleasing than equal space divisions. Scale is the proportion of minor parts to the whole. In the design of a house, scale means the nice adjustment of the sizes of windows, cornices, porches, and other parts to the size of the entire structure. Large houses may have large windows, doorways, and cornices. On a small house these details must be smaller in scale. Even though a little house is carefully planned in every other way, it may be spoiled by ponderous eaves, large windows, or stout columns holding up a heavy entrance porch.

Balance means repose and stability in a design. In a house it may be formal, with the two sides of the façade alike, or informal, with the sides unlike but so arranged that they do not disturb the equilibrium of the design. Informal balance is more difficult to achieve than is formal, for it depends upon a more subtle arrangement of sizes and positions. Informal balance must not be confused with lack of balance. It is desirable that the front of a house be either exactly formal in balance or definitely informal. An arrangement that just by a foot or two misses being formal is disturbing, because it suggests that a mistake has been made.

The style often decides whether formal or informal balance shall be used. Houses of classic inspiration—whether Georgian, Greek revival, or Italian or French Renaissance—call for formal balance. Styles that have had their origin in rural types, such as the farmhouses of colonial America, France, Spain, and Tudor England, may be informally balanced.

Rhythm may be described as an orderly feeling of movement. This does not mean that the design of a house should be fluid and unstable. While the mass of the house should give an impression of solidity and permanence, the details of material and decoration should carry the eye over its surface in a pleasant, rhythmic progress.

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Aids to rhythm are found in repetition (as of windows, bricks, or other units of material and of decorative forms); in transition (as in the curving lines of arches); in radiation (as in a Georgian fanlight); and in gradation (as in the gradual change in color or value of brick walls or slate roofs).

A house, of course, should fit its site. Lines and masses should be planned in relation to the contour of the land. The materials, too, should seem to be at home in their surroundings. If there are houses already built near by, it is only fair to select a design that is in harmony with the neighborhood. There is something unethical, for instance, about introducing a structure of gaudy pink stucco into a street of sedate colonial houses. A group of houses that have been conscientiously planned by qualified architects should not have to suffer the company of an unsightly new house of dubious origin. An ugly building is as much a public nuisance as are noise, smoke, or odors from a factory.

A noticeable fad of recent years has been the craze for charm and individuality in houses. It is natural, of course, that the owner of even the smallest house should wish it to be in some way expressive of himself and different from other houses. The full measure of pride in ownership cannot be felt for one of a row of identical houses. But charm and individuality gained through the sacrifice of more durable qualities are not worth their price. The undirected zeal for quaintness has led to numerous indiscretions in house design, such as illogical roof lines, startling combinations of colors and materials, and unbearably winsome little doorways and windows. Charm and quaintness cannot be spread over a house like frosting on a cake. They are of value only when they are by-products, so to speak, of logical structure and sincerity in design and materials, as in the Dyckman house, Fig. 3.

Lack of romance in modern life may be deplorable, but the effort to supply it through the design of one's house is open to question. An eccentric house may be suited to a Christmas card or a fairy-tale illustration, but on a twentieth century street it gives the impression of

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having been designed by way of a joke. Day-by-day association with such a house must be as much of a strain as living with someone whose chronic ambition is to be the life of the party. A house is too important and expensive a thing to be treated in a flippant manner. A



FIG. 3.—Dyckman House, New York City. A quaint old Dutch colonial house. Simple and logical in structure and use of materials. (*Courtesy of City Park Department.*)

dignified, simple structure is easier to live with, and easier to dispose of if the need for selling should arise.

Exterior beauty alone, however, cannot make a completely satisfactory house. In the field of applied art it is an accepted principle that a well-designed object must function well. A house may be beautiful to look at, but if it is not comfortable to live in and convenient for housekeeping, the design cannot be called a good one. In the house, especially, exterior design and interior usefulness are so closely related that they cannot well be separated.

SUGGESTIONS FOR STUDY

1. Visit the residence districts of your city, judging the newer houses for design qualities, simplicity, and sincerity.

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2. Obtain books of house designs from a local lumber company, and compare the houses in them with the work of well-known architects.
3. Select a house for intensive study. List both good and poor qualities of design. Use either an actual house or a photograph.

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The Building Lot

FINDING a desirable lot for building may involve a long search. A good location means a neighborhood with a well-established character or, at least, a promising future; congenial neighbors of similar social and economic level; and attractive visual surroundings, such as a pleasing view, trees, and ground formations that lend themselves to the development of lawns and gardens. High ground is better drained and better ventilated than land in a valley. If street paving, sidewalks, sewers, and other utilities are in, they will be reflected in the cost of the lot. On the other hand, a cheap piece of land without these utilities may not be a bargain by the time that they are added. All special assessments for neighborhood improvements, such as storm sewers, should be investigated and counted in on the cost of the lot.

While the motorcar has solved many transportation problems, it is still wise to choose a location not too far from a streetcar or a bus line and within walking distance of school, churches, and shopping center.

Usually, advantages must be balanced against drawbacks and the decision must be made on the basis of personal preferences. The spacious suburban lot means a long ride twice a day for the city worker. Living close to work or to school may necessitate a smaller

lot in a closely built neighborhood. Large trees are an asset and usually add considerably to the cost of the lot, but to grow flowers under them means a long, hard struggle. In this connection it might be mentioned that trees may be enjoyed without being owned. A stately oak is no less beautiful because it stands across the street. A treeless lot in a wooded section is often sold at a lower price than is the surrounding land, and would be a wise choice for anyone whose chief interest lies in growing flowers.

The future of the neighborhood is of the greatest importance in the purchase of a lot. While it is not always possible to predict the development of a neighborhood, an estimate may be made from the existing restrictions, their probable duration, and the trends shown by the growth of the city. Zoning laws are designed to prevent the invasion of residence districts by stores and factories. Deed restrictions often set a minimum price for houses to be built in a given neighborhood, and sometimes govern its architectural style. Building a house in an unrestricted neighborhood may carry the penalty of unnaturally rapid depreciation in the value of the property.

After a satisfactory lot has been found and the price agreed upon, the buyer should employ a lawyer or a title company to investigate the title to the property. A title search is not costly, as a rule, and should by no means be neglected. Serious trouble may develop in later years if there are flaws in the title record. It is the seller's duty to provide a clear title, but the buyer must find the points that need clearing. Unpaid taxes, errors in the spelling of names, and incorrect descriptions of boundaries are the usual title flaws.

If the boundaries of the land are in doubt, a survey should be made before building is started. It is extremely embarrassing to find that one's driveway lies partly on a neighbor's land, and equally painful to discover that one has made the neighbor a present of expensive shrubbery by planting it beyond the lot line.

In Europe and some parts of the United States, row houses are found in considerable numbers. Each family owns one slice of a block-long structure, with a tiny lawn in front and a bit of garden

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space directly behind it. The economy of row housing is obvious. Money is saved on land and on outside walls. One water-supply pipe and one sewer will serve two houses. A detached house standing on its own lot may easily cost a thousand dollars more than would equivalent shelter in a row house. In spite of its higher cost, however, the

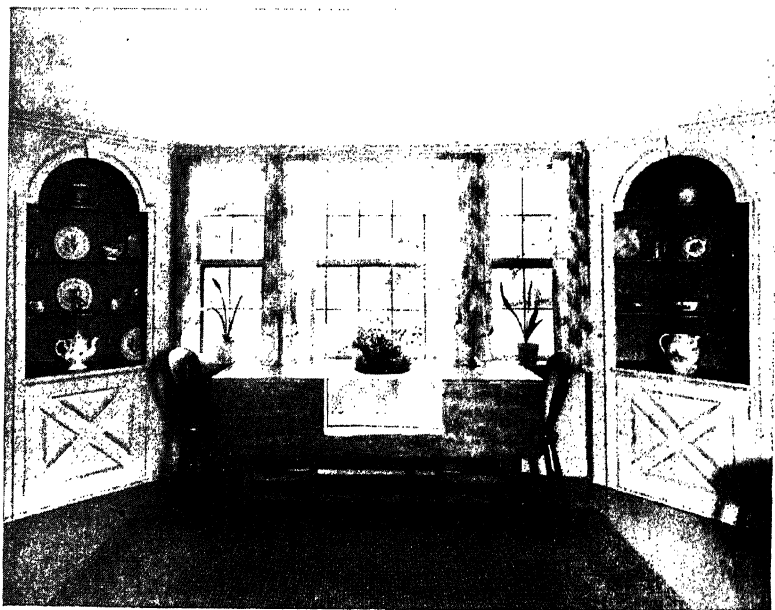


FIG. 4.—A pleasant view of the garden through the dining-room windows. (*Eleanor Raymond, architect; photograph by Paul J. Weber.*)

detached house represents the American ideal of a home. Even in the low-cost subdivisions on the edges of large cities, the separate house is standard.

A good share of the extra cost of a detached house is given to the building lot. In order to get a proper return on this additional investment, the owner should plan the lot first, then develop the house plan in relation to it. The problem of planning the lot may be approached by asking, "What is it for? What may be expected from it in comfort and enjoyment?"

THE BUILDING LOT

Indirectly, a well-planned lot contributes privacy, fresh air, and sunshine, as well as a pleasing view from the principal windows. (In Fig. 4 the dining room commands a charming view of the garden.) Directly, a lot provides an outdoor living space, a garden, and a service space, which includes a garage, a drying yard, and an entrance to be used for delivery of supplies and removal of refuse. These uses

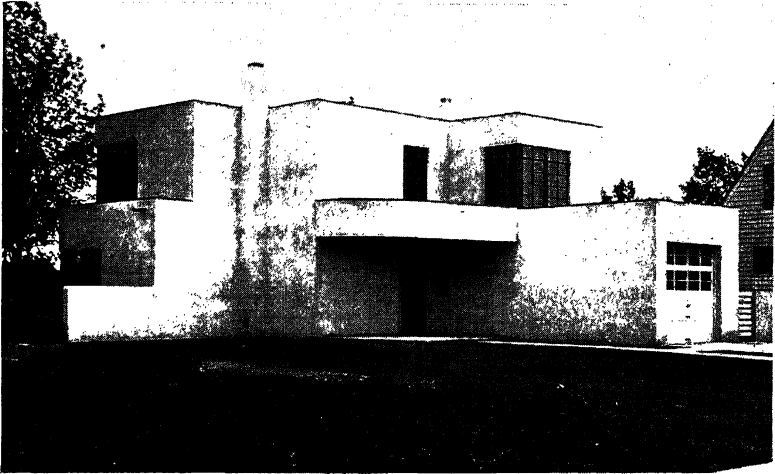


FIG. 5.—A garage on the front of the house is easily entered. Rooms at the rear may be closely tied to the outdoor living space. (*Hillard Russell, architect; photograph by Harwood.*)

constitute an ambitious program for the average small city lot, 50 feet wide by 100 feet deep.

The position of the house and the garage on the land forms the major space division of the lot plan. It used to be the fashion to place the house far back from the street, in order to have an impressive front lawn. The back yard, with its collection of stable, woodshed, pump, and trash heap, was unimportant and neglected. Today the back yard is looked upon as the best part of the lot. The stable and the trash heap have disappeared, and the house and the garage have moved forward in order to give more space to the back. The front of the lot, with its shrubbery and bit of lawn, serves only to make a

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pleasant frame for the house, as a contribution to the appearance of the street as a whole.

The garage has developed from a makeshift stable or shed into a dignified motor room, attached to the house and easily entered from the street. A well-designed garage, like those in Figs. 5 and 103, does not need to be hidden. In the early days of the motorcar the distance between the street and the garage was of relatively little importance, for the car was put away for the winter, and even in summer it was seldom used in bad weather. Today the car is used every day, all the year around; it is necessary to get into and out of the garage at least once a day. Where heavy snowfall is the rule in winter, a short approach to the garage means an immense saving of labor in keeping the drive cleared.

Modern interest in outdoor living calls for a close tying together of house and ground. A bit of lawn space or a terrace where the family can lounge, eat, or entertain guests should be included in the plan for even the smallest cottage. The requirements of such a space are privacy, shade (at least during the hours of use), shelter from winds, and easy access from the house. Because of its comparative seclusion, the back yard offers the best location for an outdoor living room. Screen planting along the sides and the back of the lot are further aids to privacy. Shade may be furnished by well-placed trees or awnings, or even by the house itself. A door leading directly from the living room or the dining room makes it easy to carry trays and chairs in and out of the house. The usefulness of an outdoor space is lessened if it can be reached only by going through the kitchen or dodging around the house from the front door.

In those sections where flies and mosquitoes rule our coming in and going out, a screened porch is an invaluable addition to the outdoor living area. Even the roof of the porch may be of screening, with a canvas cover to be unrolled in wet weather.

The drying yard, garage, and service entrance are usually grouped together. The drying yard should, of course, be near the laundry entrance. Permanent clothes-lines of wire save the labor of putting up

lines each week, but they are not handsome. It is usually possible to place them where they are not too conspicuous, from either the street or the windows, and to screen them with shrubs or a trellis.

When houses are built close together on narrow lots, the side windows are of little value. Since they look directly into the neighbor's windows, they work against privacy, and they admit little light and air. In planning houses for such crowded quarters, in order to have full advantage of the front and back exposures, these should be devoted

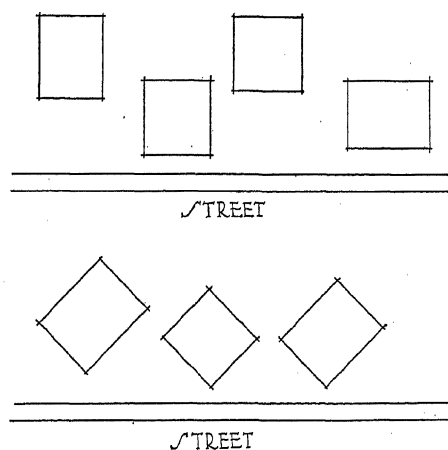


FIG. 6.—Houses placed for better exposure of the side windows.

to the principal rooms. Two changes in the placing of houses on the lot would do much to increase the usefulness of side windows. Instead of the conventional, straight, even row, houses might be staggered, or even set cornerwise to the street, as in Fig. 6. Such radical departures from convention are shocking for only a few minutes, until one has realized their advantages.

The plan of the lot should be drawn and studied before the house plans are drawn. The points of the compass, the direction of the prevailing breeze in summer, the existing trees and other planting, as well as any disadvantages, should all be marked on the plan (see Fig. 7). The relative positions of the various rooms in the house may then be

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determined in relation to the setting. As the house plan develops, it is desirable to turn back often to the lot plan, in order to retain the advantages given by the site.

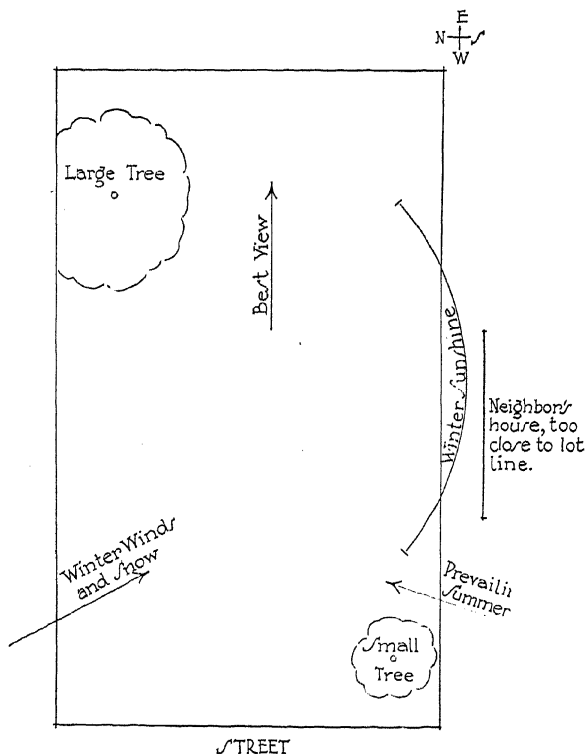


FIG. 7.—A lot plan.

SUGGESTIONS FOR STUDY

1. Find a vacant lot in a residence section of your city. Make a scale drawing of it, showing both good and bad features, as in Fig. 7.
2. Indicate the best position for a house on this lot.
3. Locate the outdoor living space, the service area, and the garage.
4. Select a house plan from a magazine, and draw a lot plan to provide the best possible setting for the house.

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Judging a Plan

WHEN a family faces the delightful and harrowing problem of building a house, the first discussions held are likely to be concerning its outside appearance. One member may cherish a collection of magazine clippings of old English houses; another may be equally attached to the formal Georgian style; and still another may lean toward the modern. But it is unwise to begin with the outside appearance of the house. The plan should be considered first and, even before that, the site for which the plan is to be made. The outward form of the house should be a direct and logical expression of the plan inside of it, and the plan itself depends on such varied factors as the contour of the land, the position of trees, the direction toward which the house is to face, the nearness of neighbors, and the possibility of a pleasant view.

After the lot has been purchased, the owner should, with the help of the architect, choose the best plan and exterior style for that particular site. Of course, if there is a choice of locations, a lot may be bought as a setting for one's favorite style of house. Dignified, formal houses of the Georgian type, for instance, need to stand on a wide, level lot. Perched on a steep hillside, such a building looks boxlike and insecure. On the other hand, a rambling, irregular house with broken roof lines is at its best when it rests comfortably along the curve of a hill.

The direction toward which the house faces should influence the plan. A conventional arrangement places the living room on the southwest, the kitchen on the northeast, and the dining room on the southeast. While every homeowner is entitled to vary the plan of his house to suit the needs and preferences of his own family, there are practical reasons for the arrangement given above. The kitchen, small in size and provided with its own source of heat, is not likely to be cold in winter, even if it is on the north. Morning sunlight is not undesirable in a kitchen, and an eastern exposure protects the room from the hot sun of summer afternoons, while the evening meal is being prepared. A large living room, with numerous doors and windows, may be drafty and hard to heat if it is on the north. For such a room, which is used more in the afternoon than in the morning, western windows will give the last bit of daylight, as well as a view of the sunset. In those sections of the country where winter brings strong north winds and summer breezes come from the south, it is best to have many windows on the south and as few as possible on the north.

The arrangement of rooms, at least in a city house, would be influenced by the amount of traffic on the street where it is to be built. The houses of a past generation, standing behind spacious lawns and large front porches that were actually used, were suited to their day of quiet streets and leisurely carriage traffic. But today, on some streets, that arrangement may be the poorest imaginable. Busses and trucks roar past the front windows, stopping conversation and filling the air with gasoline odors. Large front lawns and front porches represent a considerable waste, when we consider that their true function is to serve as outdoor living rooms. They lack the first requirement of informal family life, which is privacy. Often the best modern arrangement for a small lot is to place the house near the street, with kitchen and garage on the front and living rooms at the rear. The garden behind the house, enclosed by tall bushes and vine-covered trellises, may be almost as secluded as a room inside.

In addition to fitting the site, the plan should also fit the family that is going to live in the house. The size of the family, the occupa-

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tions, tastes, and the ages of its various members should all be considered in the making of a plan. If there are children in the family, some part of the house should be given over to the normal activities of childhood. A family with social inclinations needs large living and dining rooms for parties and dancing. Another family, with bookish and musical tastes, might prefer smaller living and dining rooms, with the space thus gained given to a music room or a library. Some families like to have large openings between hall, living room, and dining room. Other families, made up of individualists with different tastes or of widely varying ages, would be happier with regular doors to separate the rooms. There is just so much space in a small house, and each family must decide what arrangement of that space is best suited to its own needs.)

In many ways, it is a pity that the uncertainty of modern life forces one to keep an eye on the resale value of a house, even as one plans it. People are not willing to buy a house that departs too radically from the conventional arrangement. The fear of being unable to sell the house, if business should call the owner to another town, has retarded the development of new ideas in planning and construction. Perhaps it has also spared the world a large number of eccentric houses.

The prospective homeowner will find a wide variety of plans and exteriors in books and magazines devoted to the subject of houses. The study of these plans is a valuable preparation for building a house. It is wise to begin several years beforehand to collect clippings of houses, sorting them as to style or type of plan. Of course, no one would wish to build an exact copy of any one of these houses, but a great deal may be learned by studying them.

Often the plans found in magazines and books are small in scale; if one wishes to study them in detail, it is desirable to copy them in a larger size. The important thing in copying or drawing a plan is that it be kept in a uniform scale; a plan that is not in scale is worthless. The easiest way for the amateur house planner to achieve a uniform scale is by the use of squared paper. Manila paper, marked off in quarter-inch squares, such as is used in elementary schools, is con-

JUDGING A PLAN

venient and inexpensive. Let each square on paper represent one square foot on the plan. In copying a plan, draw the larger rooms first, and then fit in the smaller spaces. Sizes of halls, closets, and bathrooms are

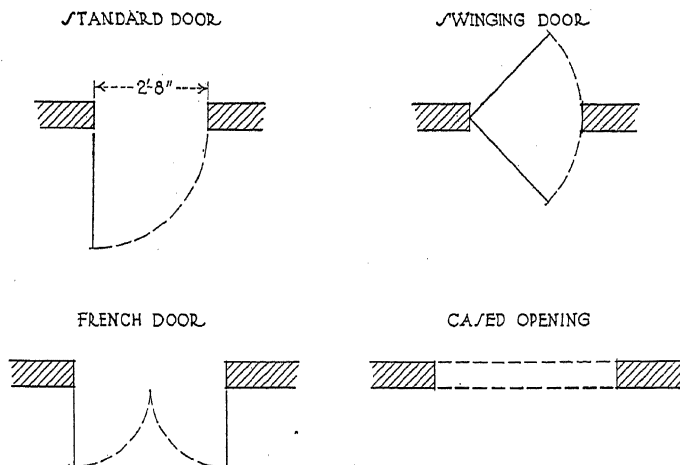


FIG. 8.—Doors.

not usually stated, but they may be guessed at by comparison with some dimension that is given. In frame construction, partitions are usually 6 inches thick; this space should be allowed as the plan is laid out.

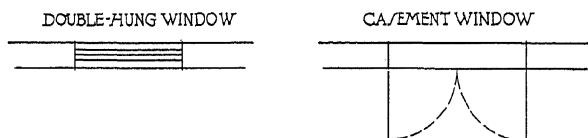


FIG. 9.—Windows.

Place the door and window openings accurately. Conventional drawings of a number of details may be found in Figs. 8, 9, and 10. A door should open into a room, swinging back so that it is not in the way as one enters. Closet doors must open out. Lavatory and bathroom doors should open in, if there is sufficient space. Anyone who has

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bumped against a door standing open in a dark hallway will realize the importance of keeping doors out of the way.

A plan is not complete until the larger pieces of furniture have been placed. Cut these out of heavy paper in some color that contrasts with the paper on which the plan is drawn, using the same scale as that used in the plan. Shift these pieces about until the best arrange-

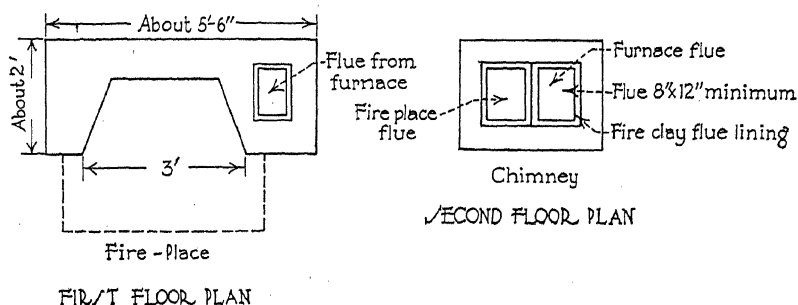


FIG. 10.—Fireplace and chimney.

ment is found; then draw lines around them to make a permanent record. The following table gives the average sizes of furniture:

<i>Furniture</i>	<i>Average Sizes</i>
Armchair.....	2 ft. × 2 ft. 6 in.
Side chair.....	18 in. × 18 in.
Sofa.....	6 ft. × 2 ft.
Desk.....	3 ft. 6 in. × 18 in.
Tea table.....	2 ft. 6 in. × 2 ft. 6 in.
Grand piano.....	5 ft. × 5 ft. 6 in.
Dining table.....	4 ft. 6 in. circle
Dining table, refectory type.....	2 ft. 6 in. × 5 ft. 6 in.
Sideboard.....	18 in. × 5 ft.
Double bed.....	4 ft. 6 in. × 6 ft. 6 in.
Single bed.....	3 ft. 3 in. × 6 ft. 6 in.
Dresser	} 18 in. × 3 ft. to 4½ ft.
Dressing table	
Chest	

In any room, furniture should be so placed as to yield its greatest use-

fulness and comfort. There are also aesthetic rewards for careful arrangement: order, balance, unity.

Let us consider each room separately. The living room is planned for the family's leisure hours. It should be a pleasant place for reading, entertaining friends, enjoying music, and playing games. The furniture usually consists of a sofa, two or three upholstered armchairs, several small tables, a desk, a radio, bookcases, and perhaps a piano. The large pieces should be placed on the plan first, and the smaller ones fitted in afterward.

For the sake of orderly appearance, rugs and large pieces of furniture are always arranged parallel to the walls, never at an angle or across a corner. The only exception to this rule may be found in the placing of chairs and small tables. A spacious, restful feeling is gained by grouping the furniture against the walls and leaving an open area in the middle of the room. The entrance from the hall should also be free and open. If, on entering a room, one must dodge around a piano or a table or even a solid armchair, the first impression will be one of crowding and inconvenience. If there is no separate entrance hall, the path from the front door to the back of the house should be kept clear of large furniture. No piece of furniture should be placed where a door will strike it.

The practice of arranging chairs and sofa in a close huddle about the fireplace was reasonable in the old days when the open fire was the sole source of heat and the only warm area in the room was a small section about the hearth. Today, the central heating plant warms the entire room; the open fire serves a decorative, rather than a practical, purpose. If there is no fire burning, a cold, dark hole in the wall is scarcely decorative. The modern use of the fireplace, therefore, calls for an arrangement of furniture that permits a view of the fire from as many points in the room as possible. It is especially pleasant to be able to see the fire as one enters the room. A barricade of chairs and tea tables about the hearth, however, limits the enjoyment of the fire to two or three people. Besides, they will probably be too warm for comfort. Unless the room is used exclusively at night, a good place for an arm-

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chair is near a window, offering the best daylight for sewing or reading, as well as enjoyment of the view. Figure 11 shows the furniture in a living room of moderate size.

If the living room is very large and is used by a number of people for varied purposes, the furniture may be arranged in groups, to allow its use simultaneously for conversation, games, and reading. A small

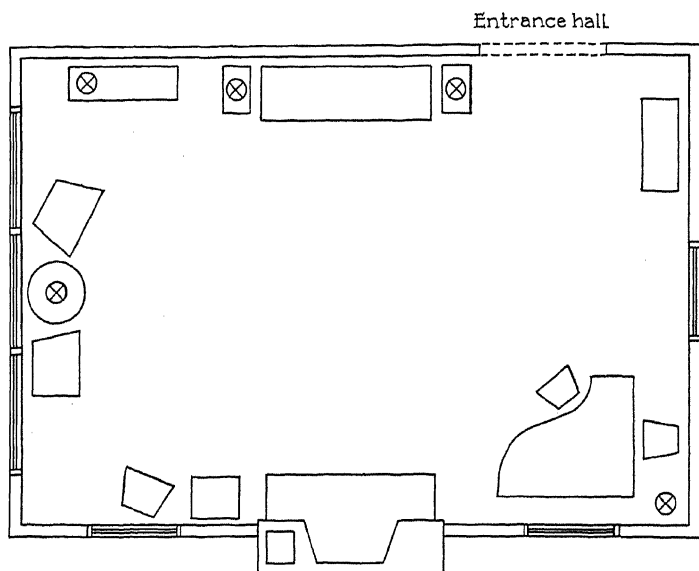


FIG. 11.—Arrangement of furniture in a living room.

room, however, cannot be so divided without looking crowded and disorderly. Furnishing a room does not mean that every wall space must be filled. The serenity and repose of the room in Fig. 12 are, in part, the result of a lack of crowding.

The placing of a desk in a living room is open to question. If it belongs to an individual and is to be used for serious study, it would be better in its owner's bedroom, unless there is a library. A desk that is intended for casual use by the entire family may be placed in the living room. To be of real service, it should be well lighted from the left, both by day and by night.

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A grand piano, even a small one, complicates the problem of arrangement in any but a very large room. If such a piano must be placed in a small living room, the best one can do is to have in the room as few other large pieces as possible. A secretary, for instance, may be moved to the dining room, and armchairs and small tables may be used instead of a sofa and a large library table.



FIG. 12.—A clear area in the center of the living room contributes to a feeling of space and serenity. (Alexander Linn, architect.)

A balanced arrangement of furniture contributes to an orderly and pleasant feeling in a room. The larger pieces should be placed at opposite ends or opposite sides of a room, instead of being grouped together. A large piece may be balanced by several smaller pieces assembled to form a unified group. Such a group might be made up of two armchairs with a table between them, and would be sufficiently large to balance a sofa or a piano.

In a bedroom, the position of the bed should be decided first. There should be adequate ventilation in summer, but the head of the

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bed should not be directly in front of a window. In a room that faces east, the sleeper's eyes should be shielded from the morning sun. All large rooms should be planned for the use of twin beds. If a double bed must be used, it should stand out into the room, with an approach on each side. The poorest place for it is in a corner. The best place for a dresser is between two windows, where the light will fall upon the face of anyone looking into the mirror. The next best place is beside a window. The light from the window should never shine directly upon the glass. A clear space about 4 feet wide is needed in front of a dresser, so that it will be possible to stoop and pull out a lower drawer in comfort. After bed and dresser have been placed, other pieces, such as an armchair, a sewing table, or a small writing desk may be put in wherever there is room. Figure 13 shows an ingenious use of space in a very small bedroom.

In the dining room there should be enough space for passing behind chairs when serving a meal (see page 42). The door from the kitchen should be hung so that it may be pushed to swing out of the way as one carries in dishes or a tray. If it is near a corner, it will be less likely to bump against the back of a chair when people are seated at the table. A serving table is most useful when it is near the kitchen door. Windows of the regular size are best for a dining room. Little windows placed high above a sideboard may seem, on first thought, to solve the problem of placing that bulky piece of furniture. Further consideration, however, shows that they are really undesirable, for they keep both the breeze and the view overhead as one sits at the table. Skillful planning will provide a wall space for the sideboard without sacrificing the windows.

A plan may be judged by the following points: economy, convenience in use and care, beauty, and provisions for health.

Economy. Since the cost of a house depends largely upon the space it contains, obviously that space means money. Building a house is for most of us an important financial undertaking; in order to get our money's worth we must use every square foot to the best advantage. Waste often occurs in halls that are larger than necessary or

JUDGING A PLAN

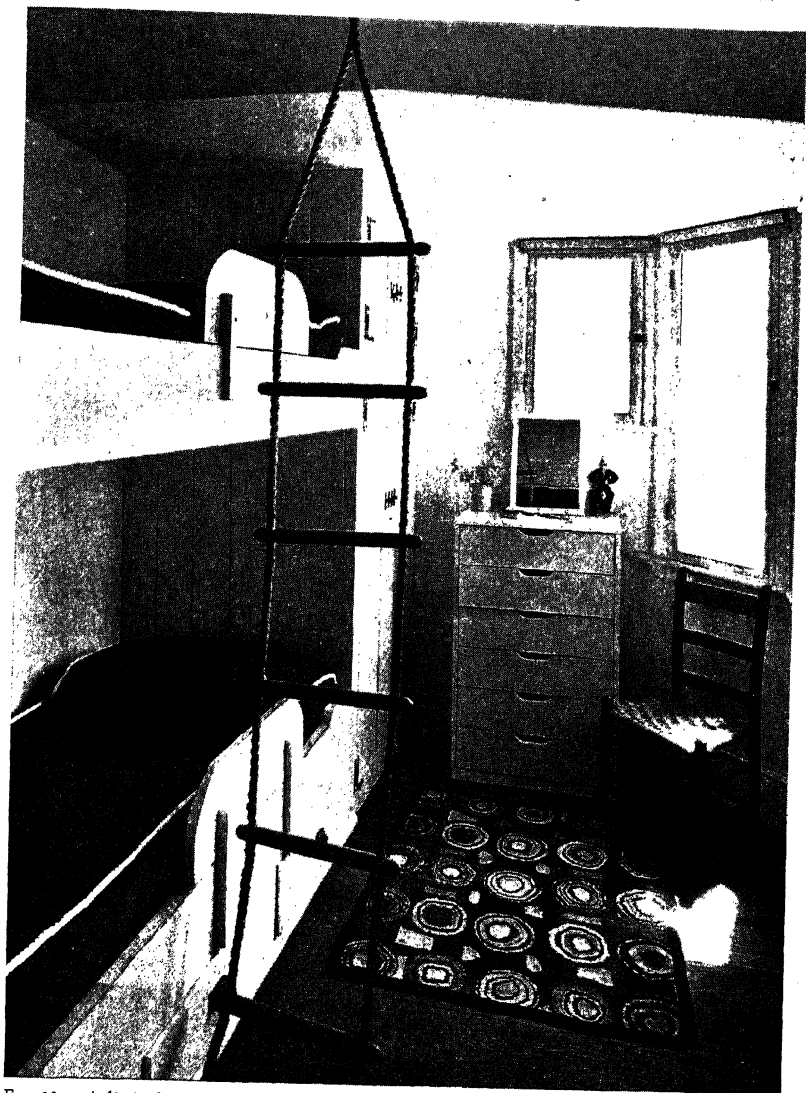


FIG. 13.—A limited space has been well used in this room for two boys. (Photograph by Richard Averill Smith.)

PLANNING THE LITTLE HOUSE

badly planned. A back hall is merely a means of circulation through the house; it should be centrally placed and as small as possible. An entrance hall like that of Fig. 14 is quite another thing. Especially in the home of a large family, it adds greatly to the seclusion of the living room and saves wear on carpet and furniture, as well as labor in keeping them clean. If there is money enough to include it, an entrance hall of generous size is a desirable luxury. A vestibule—in cold climates, at least—is not a luxury at all, because it keeps heat from escaping when the front door is opened. Halls, in general, should not occupy much more than 10 per cent of the total floor space; if they are larger than that, they are stealing space from the rooms. If you think that the hall space of the plan you are judging is too large, try to find some way of making it smaller. A hall is useful only so far as it affords circulation between the rooms of the house. When it extends past a door leading into a room, the extension may be regarded as waste. Perhaps it can be cut off and turned into storage space. If a hall is wider than necessary, a strip of space may be taken from it and given to an adjoining room.

In a small house it is not possible, as a rule, to extend a back hall to an outside wall in order to give it a window. With electric light switches conveniently located, direct daylight is not absolutely necessary in a hall or even in a stairway.

Unnecessary windows and doors also waste money. See that there are just enough doors to allow for convenient passageway through the house, and take out any that do not serve a real purpose. Windows are desirable, of course, but we must look upon extra ones as a luxury, since they are costly. The function of a window is to let in light and air, but often we see windows that seem to be nailed shut, with heavy draperies that keep out most of the light. If one really does not need the light that is kept out by the curtains, it would be more economical to have fewer windows and also fewer draperies. Changing the number and position of windows on your plan is a complicated problem. Be sure that any change you make does not harm the exterior design.

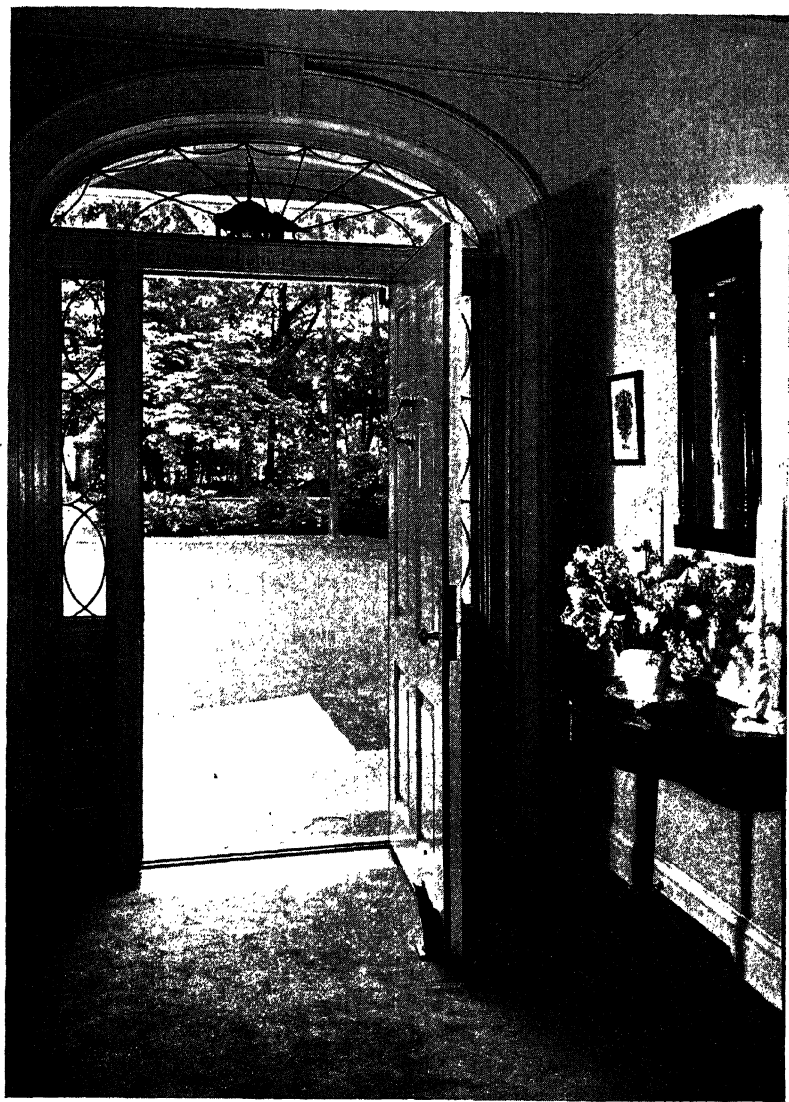


FIG. 14.—A well-designed entrance hall. (*Ethel A. Reeve, decorator; photograph by Richard Averill Smith.*)

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The size and the shape of rooms enter into the question of economy. It is hardly possible to say at what size a room becomes too large and, therefore, wasteful. Of course, we should all like to live in spacious rooms with high ceilings, if we could afford to build them and then keep them heated. Each owner must decide for himself how large his rooms may be. Economy may be served by planning rooms to fit the sizes of lumber, which comes in even sizes, that is, in pieces 10 or 12 or 14 feet long. If a house is so planned, for instance, that 13-foot joists are needed, it will be necessary to buy 14-foot pieces, and so waste 1 foot on each. This sort of economy, however, should not be carried to such an extreme that beauty of proportion and arrangement is sacrificed to it.

Rooms of irregular shape, that will not allow the use of standard sizes in rugs and furniture, are wasteful because they require specially made pieces as the only alternative for placing standard furniture in positions where it will be struck by doors or scarred by traffic through the room.

Economy may be achieved, also, by grouping the rooms that contain plumbing fixtures in the same section of the house. Generally speaking, the bathroom in a two-story house should be placed above the kitchen, unless such an arrangement spoils the plan. Placing as many partitions as possible in line, one above another, makes for simplicity of construction as well as economy.

Convenience. Imagine yourself going through the day's routine in the house you are criticizing, beginning with the preparation of breakfast, washing dishes, making beds, cleaning, and other morning duties. These things should be accomplished without wasted effort. Answering the doorbell or the telephone from the kitchen should not involve an extended tour of the first floor. A shelf or a table near the kitchen entrance for receiving the day's supply of groceries, and a chute for disposing of waste should be provided for in the plan.

A house should be planned, also, for a full measure of happy family life and enjoyment of leisure. Imagine your family spending a quiet evening in the living room of the plan you are studying. Will

there be comfortable seats and adequate lights for everyone, or must the evening meal be followed by a race for the best chair? Imagine yourself giving a dinner party. Can guests be welcomed at the front door and taken to the living room without squeezing through, or forming in Indian file? Is there a convenient place for wraps? Can the guests be taken from the living room to the dining room without passing bathroom and bedroom doors? Can dinner be cooked and served without awkwardness and unnecessary steps? It should be possible for one member of the family to entertain his or her own friends without inconvenience to the rest of the family. Is the living room so planned that one cannot be trapped in negligee by unexpected callers?

One of the chief causes of disorder, friction, and unnecessary labor in a small house is the lack of storage space. It is difficult to live gracefully when one is continually falling over baseball bats and roller skates in the back hall, and picking up coats, hats, and overshoes in the front of the house. If there are closets for these things, the family may be trained to put away their belongings. In the old days, when a broom was practically the only cleaning tool, it could be kept behind the kitchen door without inconvenience. Now, however, a special closet is needed for vacuum cleaner, floor mops, and all the other paraphernalia of cleaning.

One downstairs closet is not enough to take care of the variety of things that need to be stored. There should be a coat closet not too far from the front door, a closet in the back of the house for children's toys or for general storage, and a cleaning closet. Several small closets are better than one large one. A certain family calls its only first-floor closet the "Haunt of the Enemy." If the vacuum cleaner does not nip your ankles when you enter it, the ironing board will lean menacingly on your shoulder, or sleeve buttons will take a firm grip on your hair. Every bedroom, of course, should have its own closet of adequate size, and somewhere in the house there should be a particular place for storing linens and bedding.

Beauty. Careful planning is just as important an element as furniture and draperies in the achievement of beauty within the house.

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Well-proportioned rooms with nicely balanced windows and doors simplify the problem of furnishing. A room in the shape of a plain rectangle is more desirable than one with jogs in the walls. Although many people dislike square rooms, they are not so bad as very long, narrow ones, which are likely to resemble corridors, no matter how they are furnished. A good proportion for length and width is 3 to 4 or 3 to 5; the length should not be so much as twice the width, if the room is to be satisfying in its proportions.

Careless placing of windows and doors not only spoils the balance and order of the room but may also divide the wall spaces so that furniture is difficult to place. Wherever it is possible, formal balance in the arrangement of windows and doors will provide a quiet and orderly background for furniture. All the windows in the same room should be of the same type and, as far as possible, the same size. Pleasing vistas through doorways and windows add to the beauty of an interior.

Health. A healthful house is one that is provided with adequate light and ventilation, a pure water supply, modern plumbing, and freedom from noise, from dampness, and from drafts in winter. Some of these things may be determined from the plan. All principal rooms should have cross ventilation; that is, they should be corner rooms with windows on two sides. Building codes in some cities require a minimum window space that is 10 per cent of the floor space. Bathrooms and lavatories should have windows. On noisy streets, bedrooms should, as far as possible, be placed at the back of the house.

After the plan has been drawn and the furniture placed, make a list of desirable features that you find in the plan. Opposite this set down undesirable features. Can guests be entertained easily? Can meals be served without unnecessary steps? Does each bedroom open into the hall? If the front door opens directly into the living room, is the path across the room as short as possible? Can the necessary furniture for each room be placed in a convenient and orderly way? Are there enough closets? Are the rooms pleasing in shape and proportion? Are the halls too large? If you wish to experiment with a few

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minor changes in the plan, lay a sheet of tracing paper over the original drawing, tracing as much of it as you wish to use. If the experiment does not succeed the first time, try again with another sheet of tracing paper.

The cost of simple rectangular structures may be figured roughly from the cubic contents. The following ceiling heights may be used in finding cubic contents:

<i>Location</i>	<i>Ceiling heights, ft.</i>
Cellar 7 to 8
1st floor 8 to 9
2d floor $7\frac{1}{2}$ to $8\frac{1}{2}$
Attic 4 to 6*

* One-half of total height of roof (see Fig. 15).

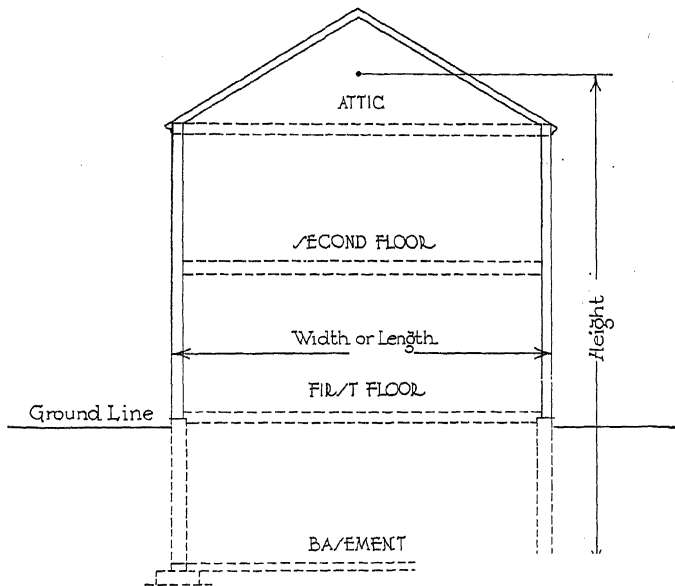


FIG. 15.—A cubage diagram.

Find out from a local contractor the approximate cost per cubic foot of building in wood, brick, and stucco and use these figures in estimating costs.

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SUGGESTIONS FOR STUDY

1. Draw a plan of your own room on squared paper. Study the arrangement of furniture, listing both good and undesirable features. Try new groupings for the best use of the room for sleeping, dressing, and study.
2. List the special housing needs of your own family with regard to daily living, entertaining, the pursuit of hobbies, and study.
3. Study the furniture arrangement of your house in relation to these needs.

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Making a Plan

A COMPLAINT frequently made by people who have built houses is that the cost of the finished house amounted to a great deal more than they anticipated from preliminary estimates. While some of the mischances that increase the cost of a house during the building period cannot be controlled by the owner, a wide variation between early estimates and final payments can be prevented. With carefully studied plans and complete specifications in the contract, the owner should not suffer unpleasant surprises about the cost when the house actually takes form. Often it is his own fault that the expense is increased. As the house is going up, he finds that it is not just what he thought it would be. He asks for an extra window here, a partition moved there, or a set of shelves tucked into some space he had never noticed before. These changes and additions are the things that add to the estimated cost. Changes in the plan are expensive when made after construction has begun, but they cost nothing when they are made on paper before the final plans are drawn and the contract is signed. The difficulty lies in thinking them out beforehand. An experienced architect can look at a small sketch of a plan and visualize the finished house, but the layman who has not spent hours working over such plans cannot. It takes practice to see oneself going

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through the motions of everyday life in an imaginary house, merely by looking at a small diagram on paper.

Practice, however, will increase even the layman's ability to visualize a house from a plan. Every hour spent in working on plans will bring its reward in a better understanding of what the finished house is to be. When one has gained the ability to read plans, both afterthoughts and regrets will be fewer. Women, especially, should be able to read plans, in order to prevent the extra steps and unnecessary fatigue caused by work done in a poorly arranged house. Studying plans that other people have drawn is good practice, but actually making plans is better, for it brings one into closer contact with the problems that must be solved and the decisions that must be made every time a house is built. For that reason, a number of the following chapters involve the making of original plans for various types of house.

Before starting to make a plan, let us consider the functions of a house. "What is it for?" is the first question a designer should ask of the object he is to design. What are houses for? Why must we live in them?

The fundamental use of the house, unchanged from the days of the cave, is to provide a safe place to sleep and protection from the weather. Other uses, so closely bound up with modern ways of living as to be very nearly as important, are the preparation and eating of food, recreation and other activities of our waking hours, and the storage of family possessions. Before the development of power-driven machinery and the factory, the home was a center for the production of goods. Scarcely less important than these material uses is the spiritual meaning of the house as a setting for family life.

The plan of Fig. 16 offers only the bare essentials of shelter for two people. It has four walls and a roof to keep out the weather, a bed to sleep in, a stove for cooking and heating combined, and a table and two chairs for use during waking hours. Shelters of this sort are found only too often in the shanty towns of our cities, but they are obviously inadequate for comfortable living according to modern

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standards. The most important single addition one could make to this house would be running water. Figure 17 has acquired a sink and a worktable. A second improvement is shown in Fig. 18, with the addition of a lavatory. The use of one room for cooking, eating, and sleeping, however, is not desirable, and the lack of storage space would make housekeeping difficult. In Fig. 19, the addition of a bedroom brings about an important upward step in living conditions. The

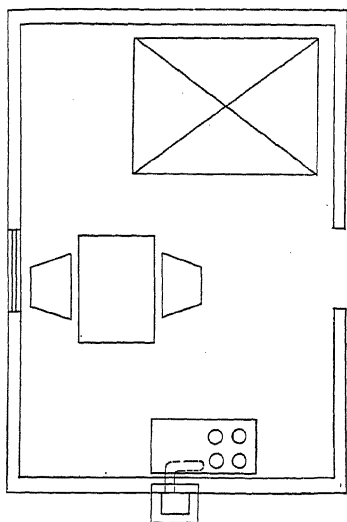


FIG. 16.—A one-room shelter.

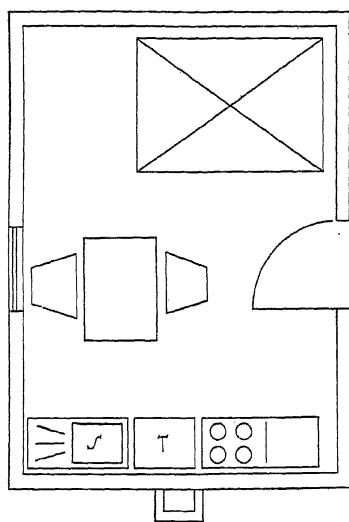


FIG. 17.—Running water added.

original room now serves as combination kitchen, dining, and living room. The laundry tub under the drainboard and the closet are aids to neatness and cleanliness. Meager as this shelter may be, it is better than thousands of homes in which Americans are living. If a luxury may be defined as anything beyond necessity, then extra rooms, such as living room, dining room, library, and sun porch, must be classed as luxuries of varying degree.

The amount of space needed for any room depends on its furniture, which in turn is determined by human measurements. To the actual size of a piece of furniture, a certain amount of floor space must

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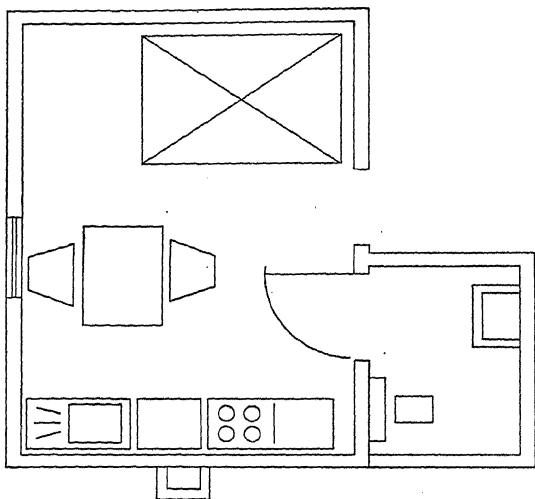


FIG. 18.—A lavatory allows a higher standard of living.

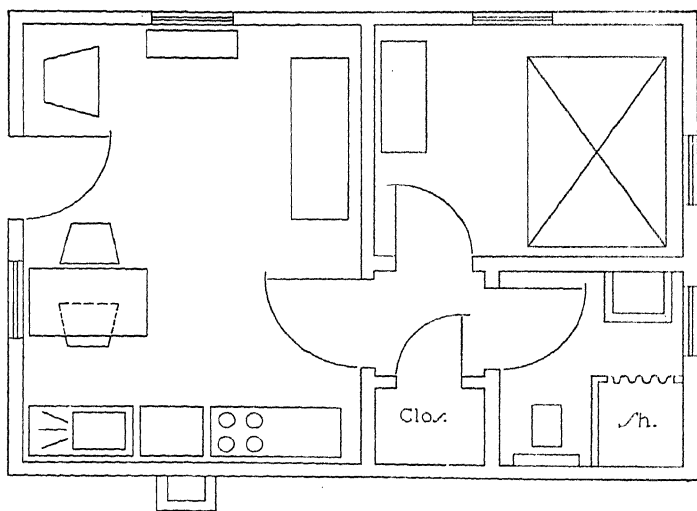


FIG. 19.—A two-room house.

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be added for the use of it. The space covered by a chair, for instance, is not enough. There must be an area about 2 feet deep in front of it for the occupant's legs and feet. The area of use needed for making a bed would be a strip about 2 feet wide across the foot and at one side (at both sides for a double bed). To pull out the bottom drawer of a dresser and stoop before it requires a space about 4 feet deep. A 2-foot space is needed between the nearest corners of two pieces, so that one may pass between them without bumping. The minimum size for a bedroom may, therefore, be built up by combining bed, dresser, and chair, with their areas of use, as in Fig. 20.

When one is seated comfortably at a dining table, the distance from the table edge to the back of the chair is about 18 inches. At least 18 inches more should be allowed for room to pass behind the chairs. The area of use for a dining table is, therefore, a strip 3 feet wide on all four sides. A sideboard resembles a dresser in requiring stooping space in front. The minimum dining space for six people may be determined by combining table, chairs, and sideboard, as in Fig. 21. The sizes of living room, study, kitchen, and other rooms may be worked out in a similar manner.

Our first exercise in making plans may be a little one-story cottage for two people, with the smallest number of rooms needed for comfortable living: living room, bedroom, kitchen, and bath. A dining alcove may be included, or one end of the living room may be used for dining. A stairway should be included in the plan if a basement is needed under the house; otherwise, provision should be made on the first floor for the heating equipment, as well as space for laundry tubs and washing machine.

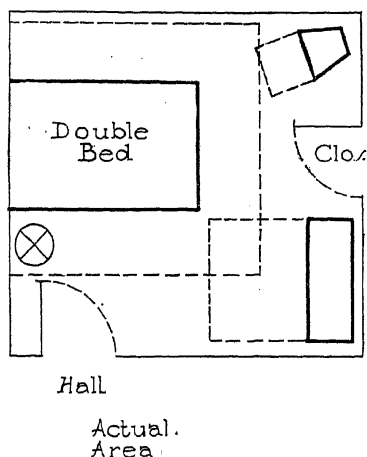


FIG. 20.—Areas of use in a bedroom.

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The plan should fit into a plain rectangle, 20 to 24 feet wide and 28 to 32 feet long. A square plan is somewhat more economical than an oblong one, for it has a larger area of floor space in proportion to the amount of enclosing wall. A square house, however, is less attractive looking on the outside than is one that has variety in its proportions. Jogs in the outline of a house of irregular shape are desirable,

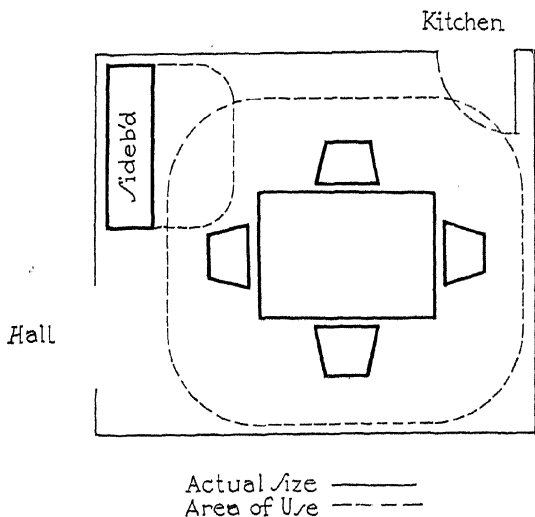


FIG. 21.—Areas of use in the dining room.

because they provide additional window space, but they add to the cost of the house. Besides, drawing the exterior of a house of irregular shape is too difficult for an introductory problem. For the sake of economy as well as simplicity, then, let us keep this first plan within a plain rectangle.

A plan may be developed, as in the preceding chapter, by starting with a single room, and adding other rooms to it; or a rectangle representing the entire house may be drawn first, and the space enclosed may be divided into the various rooms. Small quick sketches may be made in pencil, or rectangles of paper may be cut in the proper proportions to represent rooms. These may be shifted about in differ-

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ent combinations, with spaces allowed between them for halls and closets.

The table below gives the sizes of rooms for a small house. The average sizes should not be considered arbitrary; they may be varied according to the needs of the plan. The minimum sizes are the smallest that can be used with comfort. Time will be saved by memorizing some of the average sizes of rooms, of kitchen and bathroom equipment, and of doors and windows.

✓ TABLE OF ROOM SIZES

<i>Room</i>	<i>Minimum size, ft.</i>	<i>Desirable size, ft.</i>
Living room	11 × 17	13 × 22
Dining room	10 × 10	12 × 14
Dining alcove	5 × 7	7 × 9
Kitchen	7 × 10	8 × 12
Double bedroom	10 × 12	12 × 14
Single bedroom	8 × 9	9 × 12
Library or study	8 × 10	10 × 12
Playroom	8 × 8	10 × 12
Porch or sunroom	8 × 8	10 × 15
Entrance hall	5 × 5	6 × 7
Vestibule	3 × 3	5 × 6
Back hall	3 wide	4 wide
Stairway	3 wide	4 wide
Bathroom	5 × 7	7 × 8
Lavatory	2½ × 4	3 × 5
Laundry	6 × 8	8 × 12

✓ The position of the living room is the key to the entire plan, for it is the largest single space. Figure 22 shows several possible locations for it in relation to the rest of the house. After a number of trial plans have been made, choose the one you like best and copy it on squared paper.

A house as small as this one need not have an entrance hall, but the front door should be so placed as to provide the shortest possible path across one end of the living room to the rest of the house. Near the center of the plan there should be a small communication hall

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into which all the main rooms may open. Since there is only one bedroom, the bathroom may open into it, although it is better to have the bathroom opening into the hall. If the bathroom is next to, or at least near, the kitchen, the cost of plumbing may be kept down. Several bathroom and lavatory plans are shown in Fig. 23.

For the basement stairway allow a space at least $2\frac{1}{2}$ feet wide and 7 feet long. The upper door should be near the kitchen for convenience. It should also be near the service entrance to the house, so

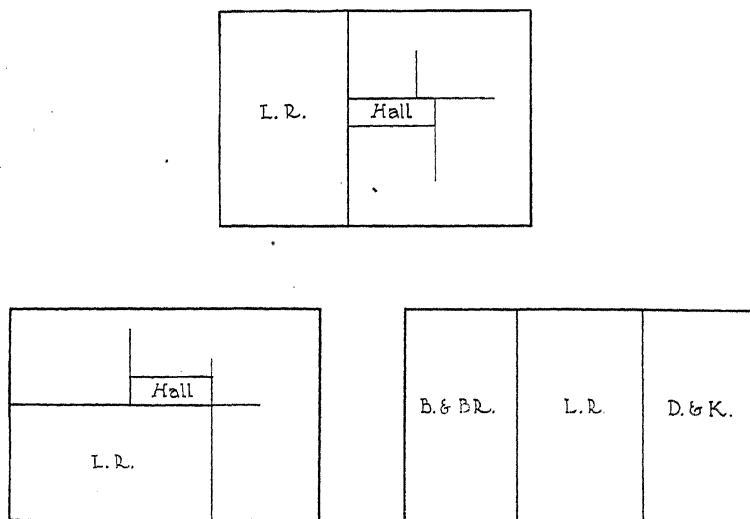


FIG. 22.—The position of the living room in relation to the plan.

that ashes and laundry may be carried out without unnecessary steps. This arrangement may not be possible if the cellar stairway is located in the center of the house. In that case, it is best to build an additional stairway in a concrete area outside the foundation, with steps leading up to the ground level.

There should be at least four closets: one for the bedroom, one for linen in either the bathroom or the hall, one for cleaning equipment, and another for general storage. A coat closet near the front door may be added. The size and shape of a closet depend upon the use that is

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to be made of it. A linen closet may be shallow and wide, with shelves close together, so that linens need not be stacked up. Shelves that slide out add greatly to convenience. A closet 18 inches deep and 3

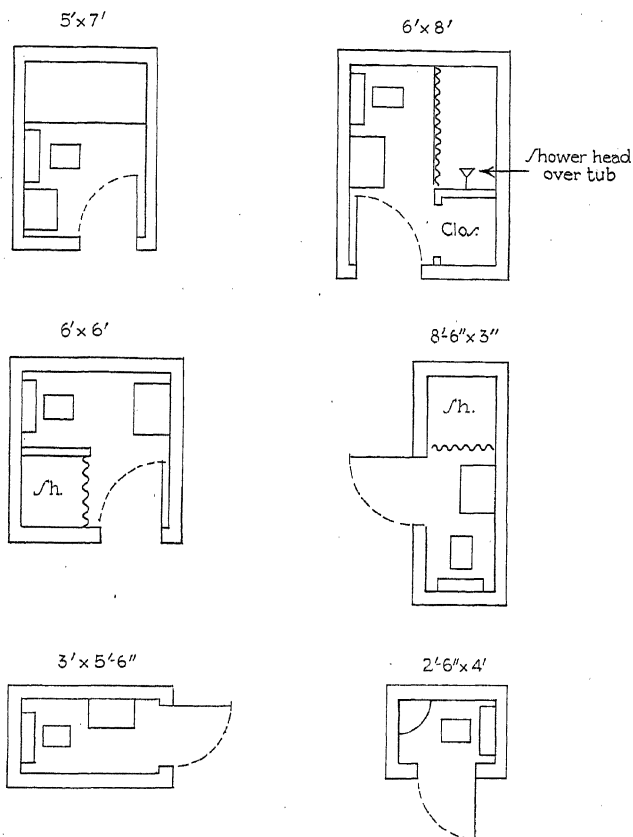


FIG. 23.—Bathrooms and lavatories.

feet wide will hold a small family's linen supply. After full allowance for headroom is made over the basement stairway, the remaining triangular space may be used for storage shelves, as shown in Fig. 24.

Corner cupboards make use of space that is not needed for any other purpose. Figure 25 shows a simply designed corner cupboard

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the lower part of which may be used for storing children's books and small toys. A closet for cleaning equipment may be about 2 feet square. Since floor mops and other cleaning tools are likely to be rather smelly, it is not wise to store them with anything else.

If there is only one bedroom closet, it should be at least 2 feet deep and 5 feet long, with the door in the center of a long side. A shelf,

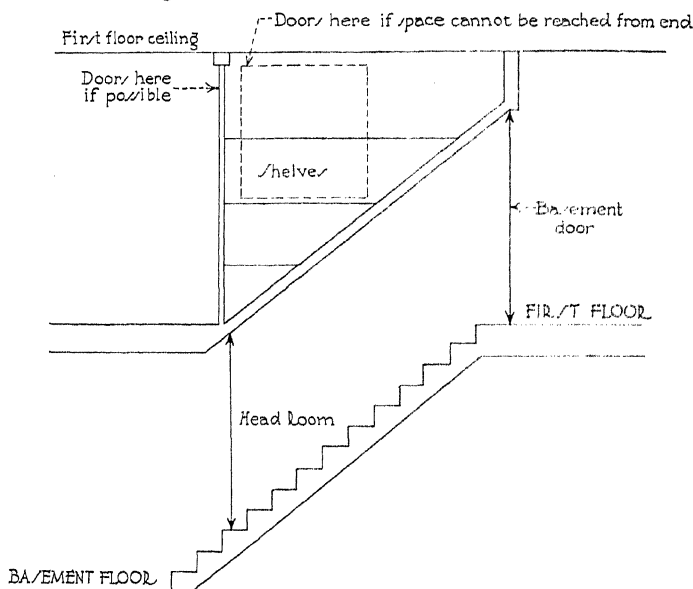


FIG. 24.—Storage space over a stairway.

with a rod beneath it for coat hangers, may be placed across each end. This arrangement allows two people to keep their clothes separated in the same closet. The disadvantage of having two small closets in a bedroom is that the extra door cuts up wall space that might be needed for furniture. A general storage closet may be of any size and proportion—tucked in wherever space can be found for it. It is poor planning to cut out a corner of a room to make a closet; nor should closets be placed on outside walls, where they cut off needed window space.

The number of doors should be kept to the minimum needed for easy circulation through the house. Do not crowd any of the doors that

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lead into rooms from the hall. A standard door is 2 feet 8 inches wide, except in a very small house, where doors may be 2 feet 6 inches wide. At least 3 inches additional on each side should be allowed for the door casing. Closet doors may be narrower than doors through which one must walk. Front doors are often 3 feet wide. The way a

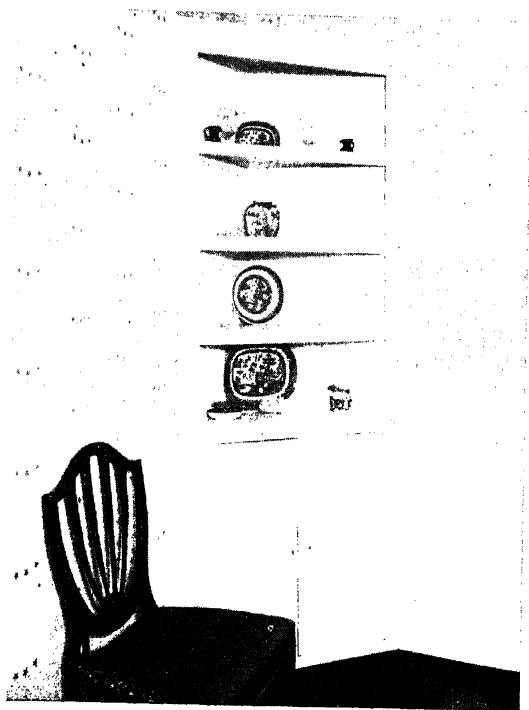


FIG. 25.—A simply designed corner cupboard.

door swings has a great deal to do with convenience. It should open into a room and should be so hung that it swings back out of the way as one enters. On all plans, doors should be drawn standing wide open, so as to show plainly that they will not strike against any piece of furniture.

The plan may include a fireplace in the living room. See Fig. 10 for the size of fireplace and flue. In a small house, one chimney should

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serve for both fireplace and furnace flue. If a fireplace is on an outside wall, a part of its depth may extend outside the house, instead of into the room. In a small room, especially, a prominent fireplace makes for a crowded feeling. A flue on an outside wall allows some heat to escape through its outer surface. When the flue ascends between rooms, this

heat helps to keep the house warm, but the entire chimney space must be taken from the plan.

No room should be smaller than the minimum size given above. Try to keep every room rectangular, without jogs in the outline. All important rooms should have corner locations, so that they may have cross ventilation. After the plan has been worked out, make a tentative arrangement of the windows. They cannot be placed definitely, of course, until the exterior of the house is drawn.

All the larger pieces of furniture should be placed as soon as the plan is drawn. A limited amount of built-in furniture may be used. Bookshelves may be set into the wall when the

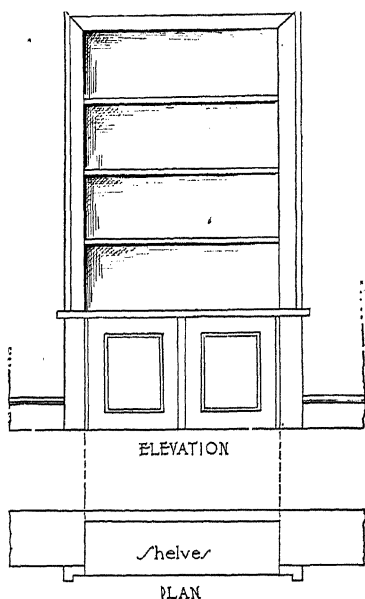


FIG. 26.—Bookshelves set into a wall.

house is built (see Figs. 26 and 27). A combination of low bookshelves on either side of the fireplace, with little square windows above them, is undesirable for several reasons. From the outside, the little, high windows are only too suggestive of a barn; inside the room, they are inadequate for supplying light and air, and they complicate the problem of curtaining the room. Their little, short curtains are undignified in a living room and are often out of harmony with the curtains that one wishes to use at the larger windows. There is no reason why windows beside the fireplace should be shorter than those on other walls of the room. Study the work of the leading architects of the

country to find out how they handle the problem. Figure 28 shows a desirable arrangement, with a fireplace flanked by a full-size window on one side and a built-in bookcase to balance it on the other. The window is placed to provide light where it is most needed, on the darker side of the room. In a small room, the fireplace may be placed at one side of the wall, to allow space for a window, as in Fig. 140.

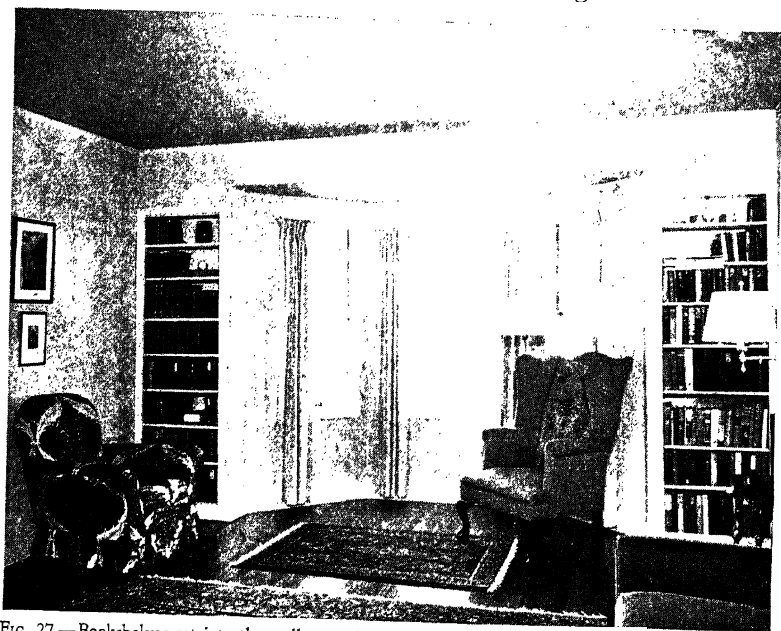


FIG. 27.—Bookshelves set into the wall on each side of a bay window. (*Alexander Linn, architect.*)

If central heating is to be used, the position of radiators or hot-air registers should be tentatively determined as the furniture is placed.

If there is no basement, space on the first floor level should be allowed for a laundry and, if the climate calls for it, a central heating plant. Storage space for screens, storm windows, lawn chairs, and other things usually kept in the basement may be added to the garage. Laundry equipment, consisting of two tubs, a washing machine, and a sorting table with a wall cupboard for supplies, may be provided in

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a small room next to the kitchen. This room may be enlarged to accommodate the heating plant also.

If a basement is to be included in this house, it should be planned on a separate sheet of paper. Since foundation walls are from 2 to 6 inches thicker than the frame walls above, the basement space will be slightly smaller than the first floor. Draw in first the stairway leading down to the basement. If it gives ready access to the service yard, it will do for all basement uses, such as carrying out ashes and laundry. Otherwise, an extra stairway must be built outside the foundation wall. Next, draw the chimney in exactly the same size and position as

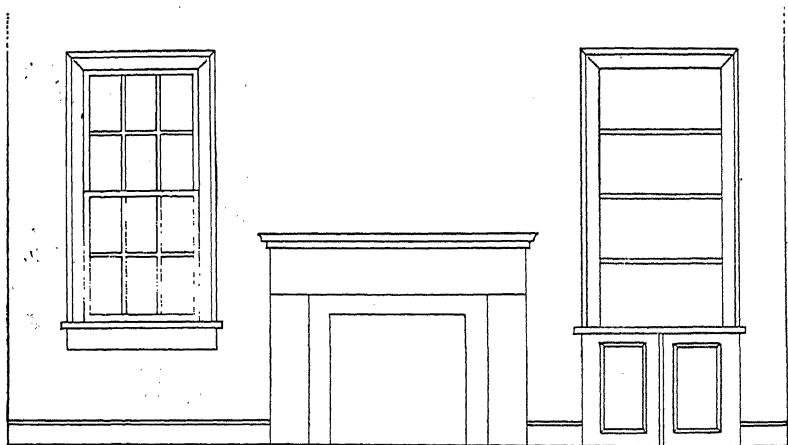


FIG. 28.—A balanced arrangement for a fireplace wall.

it is shown on the first floor. The main partition through the basement should be exactly under a main partition on the first floor, so that joists may rest upon it.

The basement is used for the heating plant, the laundry, and storage of food, fuel, and household goods. Any part left over from these uses may be made into a recreation room or a summer living room. Waste space is almost as serious a fault in a basement plan as it is upstairs.

A warm-air furnace is generally used for heating small houses. It may be indicated on the plan by a circle or square, 4 feet across. It

should be close to the chimney and fairly near the center of the house. A warm-air pipe runs from the furnace to each room. In a gravity system, if the horizontal distance traversed by one of these pipes is much over 12 feet, the room it serves will be hard to heat.

If coal is used, the bin should be large enough to hold several tons. From 80 to 100 square feet should be allowed for it on the plan. The most important thing about the position of the coalbin is that it be placed where coal trucks may reach it easily. The best place is on the side next to the driveway. It must also be near the furnace.

The laundry should be convenient to the stairway leading outdoors. It need not be very large, but space should be provided somewhere in the basement for drying clothes on rainy days.

Canned goods, fruit, and vegetables require a dark, cool place for storage. Shelves may be quite shallow—less than a foot in depth—and the space for food storage need not be very large, except in country houses where quantities of food are stored.

If possible, the basement windows should be placed on the sides and back of the house, and there should be enough of them to provide ventilation for the entire basement. South windows are desirable, throughout the basement, for the sunlight they admit in winter.

After the plans for this house have been drawn, go over them critically according to the suggestions given in Chap. 3. If you see a chance to improve them in ways of usefulness, beauty, or economy, make the changes before you begin to draw the exterior.

SUGGESTIONS FOR STUDY

1. Estimate the cost of the house you have planned, according to the cubic contents.
2. If there is no basement, estimate the space added to the first floor for heating plant, laundry, and storage space.
3. Plan a small lot as a setting for the house.
4. Select two or three small-house plans from magazines, and study the living rooms for beauty of proportion and balance and order in placing of windows and doors. Place the usual living-room furniture in each plan.

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Planning the Kitchen

TWENTY-FIVE years ago, the small-house kitchen was the subject of gloomy prophecy. Predictions of its decline and ultimate disappearance were freely made.

"The cooking of food must be taken from the house, and conducted in large cooperative kitchens, by men, and not by women. This last point is essential. . . . The preparation of food. . . . is a scientific problem; and women have not the scientific mind. They naturally take hold of every such question by the personal side. They give us not what will be best for us, but what they know we will like the best. Hence the wide diffusion of dyspepsia in civilized countries. Hence, also the complaints of young husbands that their wives do not come up to their mothers in the making of toothsome things. In fact their mothers had spoiled their digestions before their wives got a fair show. . . . The thermometer, the clock, the scales and other instruments of precision will control operations now done at haphazard or by 'rule of thumb.' There will be a scientific economy of fuel and food-materials, which probably will cover the cost of administration. . . . The disappearance of the domestic kitchen will be a notable relief to the house-mistress, relieving her from responsibility for burnt food, ill-served dishes, and the endless series of disasters attendant in so many cases on domestic cookery."¹

¹ THOMPSON, ROBERT ELLIS. *The History of the Dwelling House and Its Future*. J. B. Lippincott Company, Philadelphia. 1914.

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Prophecies of this sort were not entirely illogical. Many activities were being shifted from the home to the factory, and it was only natural to expect the cookstove to follow the spinning wheel, the loom, and the churn. But, in America at least, the kitchen refused to budge, and at present it is staging a brilliant renaissance. The advertising pages of magazines glitter with pictures of ranges and mechanical refrigerators that almost do their own thinking. Leading industrial designers have bent their talents toward making kitchen equipment fully as handsome as the furniture in the parlor. Recipes fill the air during morning broadcasting hours, and women continue to prepare delectable meals for men. Dyspepsia has gone out of style. The community kitchen has not developed because it does not fit into the American plan of family life.

No doubt the passing of the hired girl has had something to do with the improvement of the kitchen. The homemaker who does her own cooking and clearing away has a genuine interest in saving time and effort, while a lack of concern for the comfort and convenience of employees is one of the more regrettable traits of human nature.

The modern kitchen, planned entirely on a basis of function, is of recent date. Only a few years ago the standard kitchen was merely a collection of range, sink, and worktable, scattered about the room wherever they happened to fit the wall spaces. The icebox was often in the back entry or on a porch, and dishes, cooking utensils, and supplies were huddled together in the kitchen closet, far away from the places where they were used. Hundreds of unnecessary steps were taken daily in such kitchens.

In the kitchen of today the main centers of work—sink, range, refrigerator, and mixing counter—have been pulled together and grouped in relation to an orderly progress of work, with storage space for utensils and supplies at the center where they are used. The two most important factors in kitchen improvement are the grouping of work centers to save steps, and the decentralizing of storage space. The kitchen cabinet was the first step toward bringing together a

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working area and storage space for utensils used in it; today the same principle has been applied to the entire kitchen.

The use of the word "center" must not be interpreted to mean detached units. The best kitchen arrangement provides a continuous working surface between refrigerator, sink, and range. It is obvious, then, that large wall spaces, unbroken by doors or long windows, are necessary. In the U-shaped kitchen of Fig. 29A, the equipment fills all the wall space, leaving no room for a breakfast table or even a chair

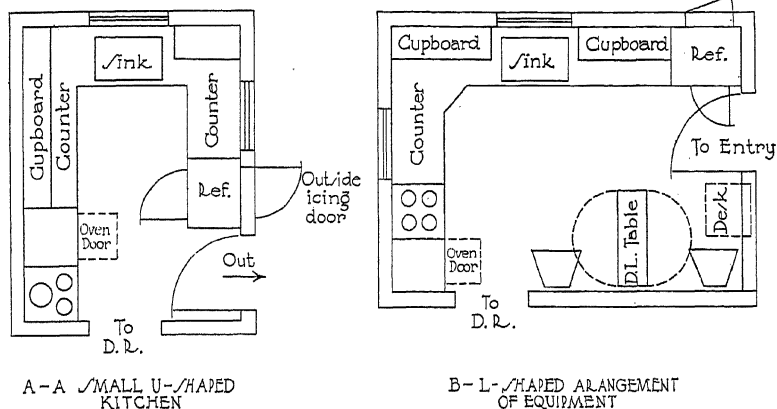


FIG. 29.—Plans for kitchens.

A larger room may have the L-shaped plan of Fig. 29B, with equipment on two adjacent walls and a breakfast table in the remaining space. The proper placing of doors is the key to efficient kitchen arrangement; their number should be kept to the minimum and, as far as possible, they should be grouped together. Closet doors opening into a kitchen often take up wall space that could be used to better advantage for equipment.

The planning of the kitchen as a separate room, however, cannot be carried very far. After all, it is a part of the house, and must be considered in relation to the plan as a whole. Sometimes the welfare of the rest of the house makes it necessary to place doors where they break into the equipment space. Figures 30A and 30B show kitchens

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with the working areas divided into two and three parts. Naturally, these arrangements are less convenient than the one-piece kitchens of the preceding drawing, for one must walk past the door spaces in moving from one center to another. Windows are less troublesome than doors, for they can in most cases be shortened and placed above a counter or the sink. In houses of formal design, however, such as the Georgian and Regency styles, full-length windows must be used, at least on the front. In such houses, either the kitchen must be placed in the back of the house or its efficiency must be subordinated to the design of the exterior.

The amount of wall space needed for a kitchen may be estimated by adding together the widths of the various pieces of equipment. Sizes given in the table below are only approximate.

<i>Equipment</i>	<i>Small Size, in.</i>	<i>Large Size, in.</i>
Sink	22	30
Drainboard or counter each side of sink	40 (20 each)	56 (28 each)
Mixing counter	26	36
Range	20 (oven below)	48 (oven at side)
Refrigerator	20	36
Counter beside refrigerator	12	20
Serving counter	20	36

Because the sink is used in connection with practically all kitchen operations, a position between the range and the refrigerator makes it easily reached from other working areas. A sink should never be placed in a corner. No one who has known the convenience of a drainboard or counter on both sides of the sink would willingly return to the old-fashioned sink with only one drainboard. Storage space at the sink should be provided for all the utensils and supplies used in dishwashing and in such food preparation as is done at the sink. Dishpans and drainers, soap, dish towels, paring knives, colanders, and graters may all be stored in drawers and shelves beneath the drainboards or counters that flank the sink. Space below the sink itself, if ventilated, will provide convenient storage room for potatoes and other vegetables that need not be kept in the refrigerator. Wall cupboards above the

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sink may be used for everyday dishes. Whether or not the sink is placed under a window depends on personal preference and on the arrangement of the room as a whole. Some housewives like to be able to see out while working at the sink (even at the risk of chipping the dishes), while others prefer the sink on an inside wall, with a breakfast table in front of the window. The exterior appearance of the house is also a factor in determining indoor arrangement.

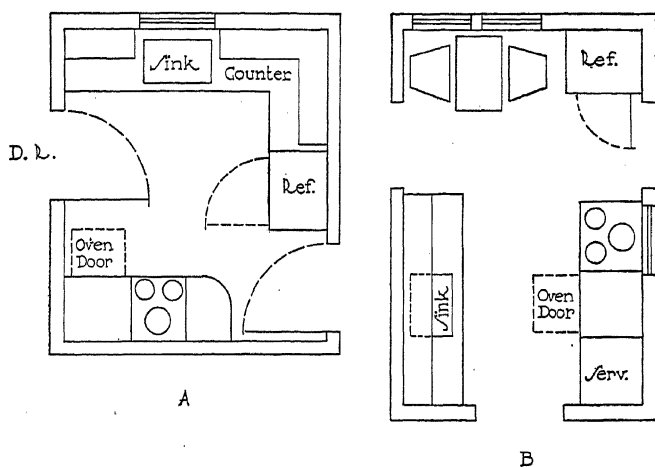


FIG. 30.—Working areas separated by doors.

The preparation of food for cooking may be divided into two parts. One part, the cleaning and paring of vegetables and fruits, is carried on at the sink. The other part may be called “dry” preparation—the making of salad dressings, cakes, and other desserts, the preparation of meats for cooking, measuring out of cereals, and similar activities. Such work needs a center of its own. Stirring up a cake or rolling out a batch of cookies cannot be really enjoyable if utensils and supplies must be crowded together in inadequate space, or if one must travel all over the kitchen to find them. A section of the counter space in every kitchen should be given to a preparation center, with storage space above and below for mixing bowls, wooden spoons, baking pans, and staples. Flour and sugar may be kept in metal-lined containers

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below the counter. Spices, baking powder, cereals, coffee, and tea, may be stored in the wall cupboards above. The electric mixer should be stationed at this counter. If the preparation center is placed near the refrigerator, eggs, milk, and butter may be reached easily.

The dishing up of hot foods from range to dining table needs to be done with utmost dispatch. For this reason, the range should be convenient to the dining-room door. A serving counter next to the range provides a place for assembling plates and serving dishes, both on their way to the table and on their return journey after the meal. The serving counter may be used also as an auxiliary to the range during cooking operations. Dishes, silver, glass, and linens should be stored above and below the serving counter. At the cooking center, storage space should be provided for those cooking pans whose use begins at the range, and for lids, pot holders, stirring spoons, meat forks, and knives. A tall, narrow cupboard with hooks set into the walls makes a convenient place for hanging pans and skillets; lids and shallow pans may be kept in wire racks on the inside of the cupboard door or on a shelf with narrow vertical divisions. Similar spaces may be provided for trays and platters. A little shelf space above the range should be provided for seasonings that are added during cooking processes.

The trend in range design today is toward low ovens, either beside the surface cooking units, to form a table top, or below them. A clear space, at least 4 feet wide, should be allowed in front of the oven door, so that one may stoop to take out a roast without backing into some other piece of equipment.

The refrigerator is a highly specialized part of the kitchen storage space. The only work done directly at the refrigerator consists of arrangement and cleaning. A counter space next to the refrigerator makes such work easier; it also serves as a receiving table for incoming supplies. If a separate counter cannot be set aside for such use, the mixing counter may double as an auxiliary to the refrigerator. Whether the refrigerator door opens at the right or the left side depends on its relation to the rest of the room, and especially to the mixing center.

Naturally, the work surface used in connection with the refrigerator should be on the same side as the handle of the door. The refrigerator should be near the kitchen entrance, for easy storage of supplies. On no account should the refrigerator be placed where it breaks in between two working surfaces that are used together, such as the mixing center and the range, or the range and the sink. Studies are being made of the preferred height for sink and counters. Naturally, a tall woman needs a higher working surface than does a short one. If the work is to be done while sitting, still another height is needed. The height of built-in equipment cannot at present be easily changed, once it is installed. When the resale value of the house is an important factor, or when a maid is to be employed, a standard height of about 3 feet is used.

Abundant shelf space for utensils and dishes does away with the need for crowding or piling them up. The result is greater convenience in using, as well as fewer chipped edges on glass and china. If all the wall spaces above equipment and counters are filled in with cupboards, enough storage space will be provided for the average family. The pantry has been squeezed out of the small house of today by high building costs, but it has not been entirely lost, for the cupboards and counters formerly used in the pantry are now set up in the kitchen. In fact, the modern kitchen might be called a combination of the pantry and the kitchen of a generation ago. The pantry is still useful where large families or frequent entertaining may call for wholesale dishwashing. A second sink or an electric dishwasher, in the pantry, is useful for washing silver, glasses, and the best china, while the kitchen sink is used for pots and pans.

Range, refrigerator, and counters measure about 2 feet in depth. The sink is a few inches smaller. If a flat-rimmed sink is to be set into a counter, it should be placed near the front edge, to ensure a comfortable position for dishwashing. A depth of 12 inches is allowed for wall cupboards. A clear space at least 18 inches high should be allowed between a work surface and the bottom of the wall cupboard above it. Shelves should be adjustable. Hinged doors are commonly

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used on cupboards; sliding doors require a little more space and cost a bit more. Roll-up doors, constructed like the cover of a roll-top desk, are also used. A roller shade makes a satisfactory and inexpensive substitute for a cupboard door.

Many families like to eat at least one meal a day in the kitchen. A drop-leaf table, with chairs or stools, offers a more flexible arrangement

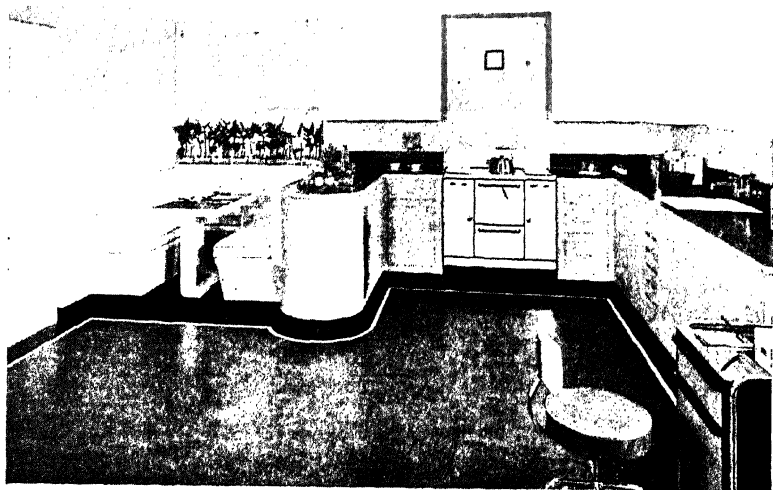


FIG. 31.—A modern kitchen. The dining alcove and the desk do not interrupt the continuous line of working surface. (Courtesy Congoleum-Nairn, Inc.)

than a built-in dining alcove. If the eating center is planned as a separate unit, as in Fig. 31, apart from the work centers, it will not interfere with kitchen routine. An enclosed alcove without a window is likely to be stuffy and uncomfortable in hot weather.

If the kitchen is to be used for laundry work, tubs with hinged tops in the form of drain boards may be installed next to the sink. The washing machine may be pushed under a section of the counter when it is not in use. If an ironing board is to be hung from the wall, it should be placed apart from the food preparation centers.

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The kitchen may be thought of as a highly specialized workshop, devoted solely to the preparation and serving of meals and the consequent cleaning up. Such a room may be small and compact, as in Fig. 29A, with stove, sink, refrigerator and work surface grouped close together, and an open space in the center of the room just large enough for one or two people to work without crowding. In the tiny kitchenettes of city apartments, many ingenious arrangements for saving space have been worked out. Many women, however, prefer to use their kitchens for additional activities. A comfortable chair near a bookshelf allows the housewife to rest for brief periods when cooking requires only intermittent attention. A small desk, a mending kit, and a radio are all useful additions to a kitchen. Small children are easily supervised if a corner of the room is provided with diminutive chairs and table where they may eat their meals and play. The hours spent by the housewife in the kitchen are woven into the complicated and varied fabric of her life; they cannot be compared with the time that the factory worker spends at his machine. The purpose of efficient kitchen arrangement is not to enable the housewife to turn out work with machinelike speed, but to make kitchen work pleasanter and easier.

SUGGESTIONS FOR STUDY

1. Draw a plan to scale of the kitchen in your own home. Study the placing of equipment for convenience and the saving of energy.
2. Using tracing paper over the original drawing, plan several new arrangements of the principal work centers, in order to bring them closer together or to provide additional counter space where it may be needed.
3. Plan new arrangements of storage space in relation to work centers, adding wall cupboards where they are needed.
4. If you have access to old magazines, an interesting study may be made of the development of the kitchen during the past 20 or 30 years.

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PLANNING THE LITTLE HOUSE

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ROBERTS, EVELYN, MAUD WILSON, and RUTH THAYER. Standards for Working-surface Heights and Other Space Units of the Dwelling. *Bulletin 345*. Oregon State College and Washington State Agricultural College.

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Manufacturers of sinks, ranges, and other kitchen equipment offer useful books on kitchen planning.

Drawing Elevations

NOW that the plan has been finished, we are ready to work on the exterior appearance of the house. Actually, of course, houses do not develop quite this way. The plan and the exterior cannot be separated so rigidly into two parts. They grow up together. With a little practice you will be able to keep one eye on the outside as you draw the plan. And indeed, you will often have to leave the exterior and go back to the plan to work out minor changes there, in order to improve the appearance of the outside.

The exterior of this house may be developed as a simple colonial cottage of the Cape Cod type, with double-hung, shuttered windows, and a plain gable roof (see page 182 and Fig. 32). Before starting to draw the elevations, study pictures of small colonial cottages. Notice, especially, the details of the doorway and windows, and of the edge of the roof. Compare houses that have been designed by competent architects with others that have been built obviously for speculative purposes. You will see that the greater beauty of the former more than balances the cost of employing an architect. The design of a small house deserves just as much skill and consideration as that of a large one. Scale, or the proportion of details to the size of the whole, is especially important in a very little house. Narrow cornices and

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delicately designed doors and windows are in the proper scale for a small house. You will find this refinement of detail in the work of skillful architects. On the other hand, a common fault of the carelessly designed cottage is the use of large windows, top-heavy doorways and massive cornices.

The foundation of a small house should be quite low, to produce a settled and substantial feeling about its appearance. A low founda-



FIG. 32.—A modern version of the Cape Cod cottage. (Walter Bradnee Kirby, architect.)

tion is a little more expensive than a high one, for it requires a deeper cellar excavation, besides concrete areas around any windows that extend below the ground level. This is one of only a few instances where extra money must be spent for beauty of design. A little study of the work of the leading architects of the country will show you that they think a low foundation is worth the extra cost.

The exterior of a house may be shown by elevations, that is, flat diagrams of the sides of the house. They represent height and width, but no depth, and for that reason do not give a complete picture of the

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house unless they are studied with the plans. Figure 33 shows the relation of the plan to the elevations.

The elevations of this house may be drawn on plain Manila paper or on squared paper, such as has been used for the plans. If plain paper is used, a T square, a triangle, and some sort of scale ruler are

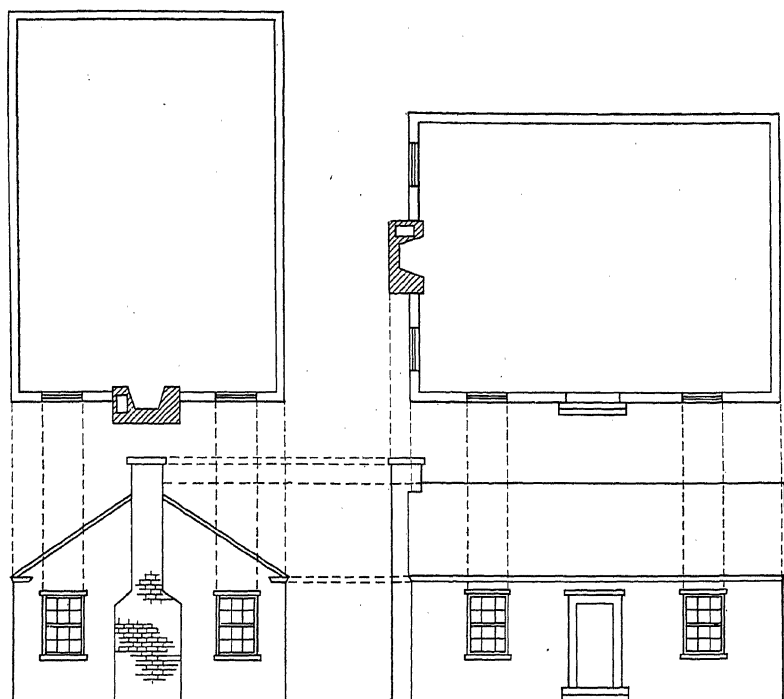


FIG. 33.—Elevations in relation to the plan.

needed for drawing the elevations. A scale may be made from a strip of stiff paper, such as oak tag. On one edge mark off spaces to correspond with the squares on the paper used for the plan, and number them. Each space then will represent one linear foot, and elevations may be drawn exactly the same size as the plan.

Draw, first, one of the narrow sides of the house, in order to determine the slant of the roof. (The ridgepole of a gable roof should

PLANNING THE LITTLE HOUSE

run lengthwise. Placing it across the house produces a clumsy appearance.) For this drawing use either end of the house, whichever one you consider more interesting.

An elevation should be drawn as a house is built—from the ground up. A horizontal line an inch or two from the bottom of the paper may represent the ground level. Next, vertical lines are drawn indicating the width of the elevation. The floor level, not more than 1 foot above the ground, and the ceiling, about 8 feet above the floor, may be indicated by dotted lines. Ceiling heights vary with the size and type of house, and with the climate. In hot countries high ceilings are needed for comfort, while low ones save fuel where winters are severe. Economy in the use of standard lumber sizes is also a factor in determining the height of the ceiling.

Use your own judgment about the height of the ridgepole. Sketch in lightly several roof lines at different angles, and choose the one you think most pleasing in relation to the rest of the house. Since only one story of this house is used, the roof need not be very steep, for the space it encloses must be considered as waste. The ridge, of course, should be above the exact center of the end wall.

When the end elevation has been outlined, and before any windows are placed, draw one of the long sides of the house. See Fig. 33 for the relation of the side to the end elevation. If you wish to draw all four sides of the house, draw the other two elevations in outline before you start to put in windows and doors.

At this point, look again at the pictures of Cape Cod cottages, noticing especially the design and arrangement of doors and windows. Usually the front of the house was formally balanced, with the door in the middle and one or two windows on each side, according to the size of the house. Informal balance, however, was occasionally used. We can scarcely hope to achieve formal balance all around the house, but we should at least work for orderly arrangement and interesting space division on the sides and back. Colonial windows should be placed singly, rather than in pairs, and the glass should be divided into small panes all over, not just in the upper half. Figure 34 shows a typi-

DRAWING ELEVATIONS

cal colonial window, suitable for a small house. In all traditional styles, window panes are taller than they are wide.

All the windows in an elevation should be drawn lightly in outline before any of their details are put in. Try the windows first in the position indicated on the plan. If this arrangement is not pleasing the windows will have to be shifted back and forth until a better space division is found. (Rectangles of gray paper used to represent the windows will save much erasing.)

Any changes in the position of the windows must be tried out on the plans before the final decision is made as to placing them.

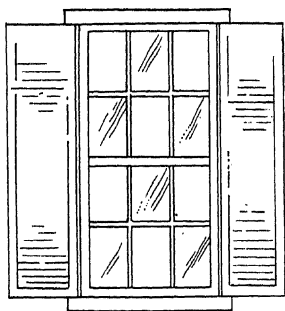


FIG. 34.—A typical colonial window

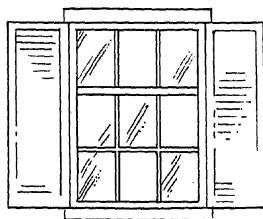


FIG. 35.—A kitchen window for a colonial house.

Sometimes, when partitions and furniture arrangement will not permit the window spacing that looks best from the outside, there is a serious conflict between the plan and the exterior. Each house must be worked out by itself; no general rule can be given. At times it is advisable to sacrifice a bit of the exterior design for the sake of greater beauty or convenience indoors. At other times, it is better to accept a somewhat less convenient or symmetrical room in order that passersby may not lift their eyebrows at the façade.

For small, inexpensive houses, windows and doors are usually bought ready-made from the mill, in standard sizes. One must decide first what sizes look best in relation to the house as a whole; then the stock sizes nearest to them may be found in the mill catalogue. It may

PLANNING THE LITTLE HOUSE

be necessary to use several sizes for the windows of an entire house, but, unless there is a good reason for doing otherwise, the same size should be used for all the windows in any one room. The width of windows in a house as small as this one should not be more than 30 inches.

A convenient height for window sills is about 2 feet from the floor, except in the case of windows above a sink, where they must be at a height of 4 feet. Figure 35 shows a short kitchen window that may be used with the colonial window of Fig. 34.

Since the rooms of this house are small, with low ceilings, the doors and windows may be kept at the same level. The standard height of an inside door is 6 feet, 8 inches, and, when the ceiling is 8 feet or less in height, the same height will do for windows. The easiest method of producing a designed effect, especially in small rooms, is to maintain horizontal lines.

This statement must not be interpreted as a general rule covering all door and window heights, regardless of the size and proportions of the room. Doors and windows differ so widely in their functions that they cannot be governed by the same rules. Doors are used to allow people to pass through the walls of a house with a minimum of effort. An opening approximately 7 feet high will allow a very tall man to walk through without pain or even anxiety. The purpose of windows is to provide light and ventilation. Both air and light are better distributed if the windows extend upward nearly to the ceiling. (In the Northern states the dark short days of winter provide little enough daylight, even with the largest window area permitted by the climate.)

It is obvious, then, that, while there is no reason for making doors much taller than the standard size, window heights depend upon the height of the ceiling. In the larger houses of Figs. 49 and 110, for instance, the tops of first-floor windows are at a considerably higher level than the lintel of the door, indicating a ceiling at least 9 feet high.

If the ceiling is less than 8 feet in height, the window heads may fit directly against it, as in Fig. 4. A part of the pleasant appearance

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of this room is the result of the neat fitting together of the various parts of the background—windows, cupboards, and ceiling.

The details of the exterior, such as the doorway and the windows, may be copied from photographs. Be sure to select a good example.

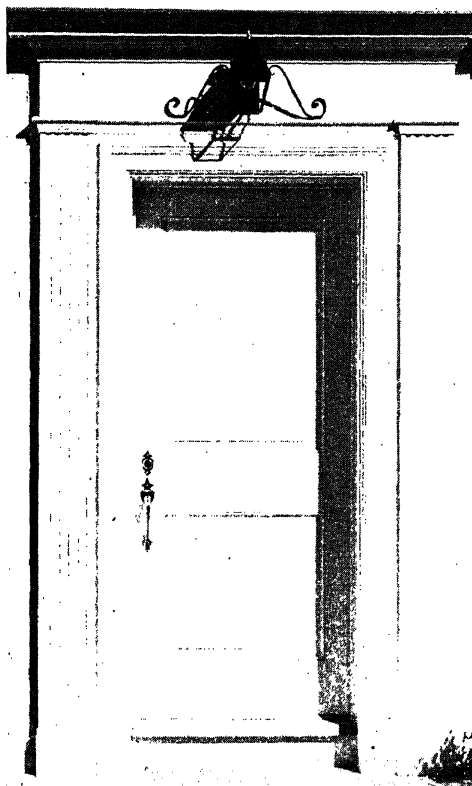


FIG. 36.—A simple doorway for a colonial cottage. (Dwight James Baum, architect; courtesy of Curtis Companies Inc.)

The characteristic door of a Cape Cod cottage was made of paneled wood. Sometimes a row of little window lights was used above the door, or down each side. The use of glass in the door of Fig. 32 is a modern innovation. The moldings and other decorations used

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around the doorway should be simple and unpretentious. Elaborate fanlights and pediments should be saved for larger houses. A simple doorway is shown in Fig. 36.

The elevations may be finished with flat water-color washes or with colored pencils. The color scheme of a little cottage should be simple and unobtrusive. The walls may be white-painted siding, or gray or brown shingles. The roof may be a natural, weathered, grayish brown, or a soft green. Red is not a particularly suitable color for a colonial roof. The modern type of varicolored roofing in crazy-quilt effect is particularly objectionable on colonial cottages. Whatever variation in color is used should appear to be natural and unstudied.

The trim (window frames, corner boards, cornices, etc.) should not produce a startling contrast with the walls, in either color or value. Prominent trim makes a house seem smaller than it really is and emphasizes any faults in space division. For both walls and trim, white is always satisfactory. White colonial houses seldom have dark trim. The door should be painted white or some grayed color not too far in value from that of the house. Admirers of the colonial style suffer acutely when they see a golden-oak door on a pleasant white house. On a house of brown or gray-stained shingles, pure white trim is unpleasantly glaring. Ivory or light tan or some light, grayed color should be used.

The chimney, of course, must be of masonry—brick or cement. If you think a red-brick chimney stands out too prominently against a white wall, it may be made less conspicuous with a coat of white paint. Many of the chimneys on Cape Cod cottages were painted white, with a black band around the top to offset the darkening effect of smoke.

To make a finished drawing, groups of shrubbery may be sketched in to make a frame for the house. They should not be too large or too uniform in size or spacing. Varying shades of green may be used to suggest diversified planting.

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SUGGESTIONS FOR STUDY

1. Visit the residence districts of your city, studying the small one-story houses. Look especially at the details of doorway and windows, the finish of the roof edge, and the foundation height.

2. Select a picture of a poorly designed small house, and draw elevations for a better exterior. (It will be necessary to have the plans of the house also.) If you wish to use an actual house, make measured drawings of the plan and make snapshots or sketches of the exterior.

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The Larger One-story House

SO FAR the house has been considered as a shelter for just two people. Many families would find the little cottage of Chap. 4 inadequate for their needs. If there are children in the family, additional rooms for sleeping, as well as a place for indoor play, are required for comfortable living. Even if there are only two in the family, an extra bedroom adds to the usefulness of a house. It may serve as a guest room, a study, or a music room. The present problem, therefore, is concerned with a small, one-story house similar to the first, but with two bedrooms. Since it is more complicated than the other, the plan may have an irregular shape, consisting of a large central mass, with one extension—or possibly two. Since a projection adds extra window space, it should be used for one of the principal rooms, rather than for such minor features as kitchen, bathroom, or closets. A projection is especially useful when it improves the outlook of a room; for instance, in those regions where the southern exposure is the best, a north room may be extended beyond the main mass to acquire a south window.

The relation of the house to the lot is always the first consideration. Select either a real or an imaginary building site, determining the orientation, the prevailing summer wind, and the direction of the best outlook. It is suggested that a level lot, 60 to 70 feet wide and 100 feet

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deep, be chosen. Make a small quick sketch of the lot, locating the house for best sunshine, breeze, and outlook, as shown in Fig. 7.

For starting the plan, use any method mentioned before or start with the plan you have already made, adding a second bedroom. As

L - Living Room-Dining Space
K - Kitchen
E - Entrance
B - Bed Rooms & Bath

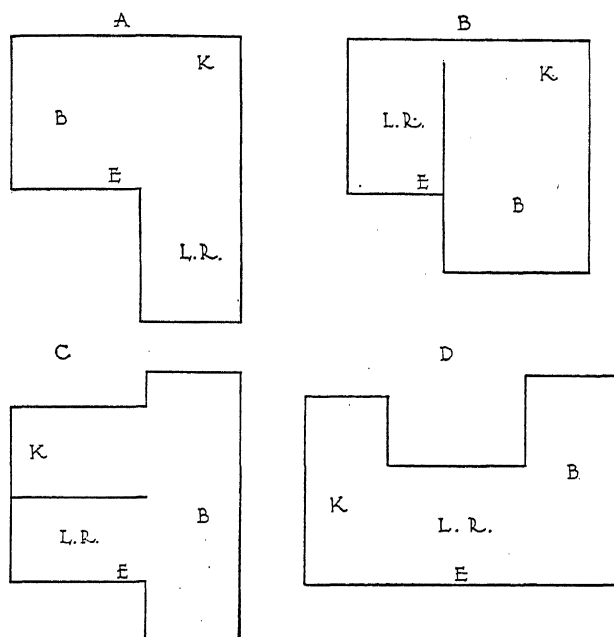


FIG. 37.—Suggested shapes and space divisions for a larger one-story house.

in the first plan, the position of the living room determines the arrangement of the entire house. Figure 37 shows a few basic divisions of the space in a plan of irregular shape. Certain fundamental rules for arrangement are standard for all plans. The living room, dining space, and kitchen should be grouped together, as should the bedrooms and bath. The use of more than one bedroom calls for a few rules: it should not be necessary to go through one bedroom to get into another or

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to the bathroom. Each bedroom and the bathroom should open into the hall. A permissible but less desirable arrangement places the bathroom between the bedrooms, with a door leading into each. There should, of course, be a closet for each bedroom, but *not* cut out

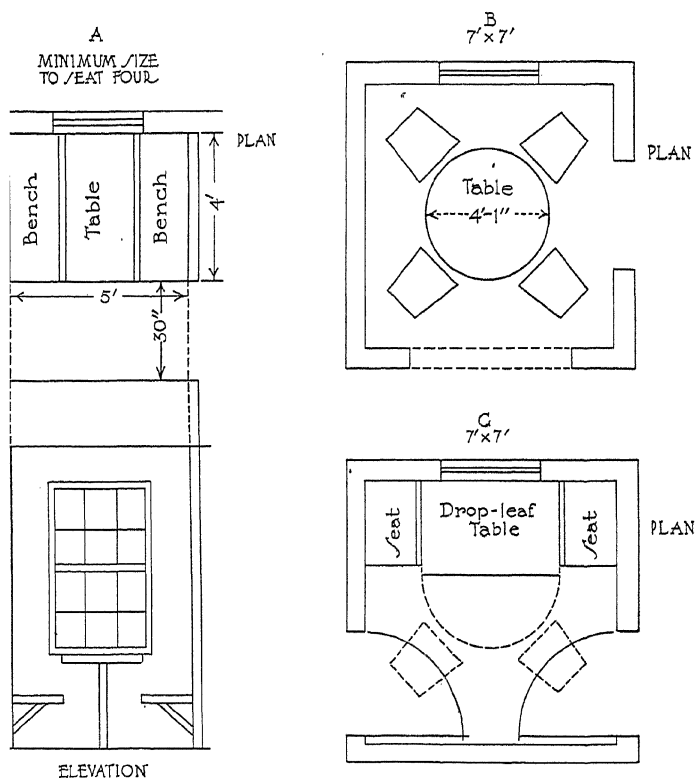


FIG. 38.—Dining alcoves.

of a corner. Finally, it is desirable that each bedroom have cross ventilation, that is, a corner location.

In addition to the bedroom closets, other storage spaces should be included, as in the first plan.

The dining room may be full size or only an alcove, or it may be included in one end of the living room. If an alcove is used, it should

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be separate from the kitchen and so placed that one may enter it without passing through the kitchen. See Fig. 38 for the plans and dimensions of dining alcoves. In a small house it is wasteful of space to have a dining room *and* a dining alcove.

In this plan, as in the first, a small hallway should be centrally placed so that several rooms may open into it. An entrance hall may

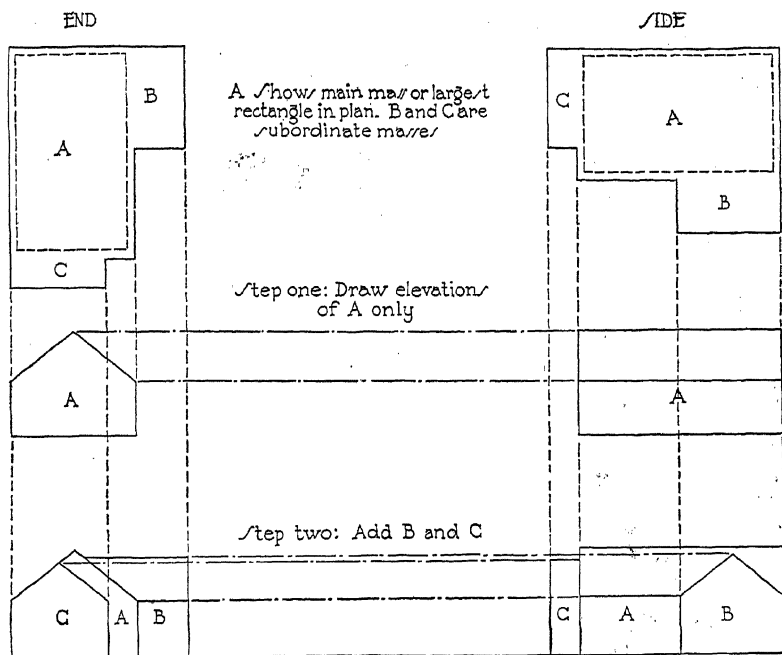


FIG. 39.—Steps in drawing elevations for irregular plans.

be used, but it is not necessary in so small a house. The plan may be arranged with the living room on the back, facing the garden, and the kitchen on the front.

The advantages of an attached garage are obvious. The disadvantages are: the cutting off of window space, greater difficulty in achieving a pleasing exterior, and greater cost in those cities where fireproof walls are required. A single-car garage should measure

PLANNING THE LITTLE HOUSE

10 by 18 feet. The placing of an attached garage depends on the style of the house and the contour of the land. A garage on the north side of the house occupies the least desirable window space and shelters the house from winter winds.

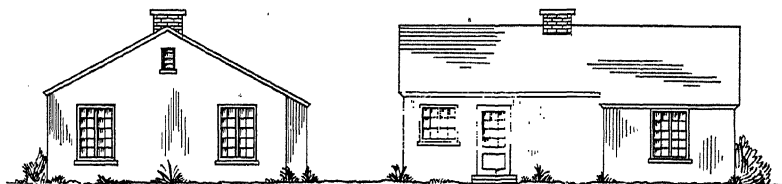


FIG. 40.—A simple roof for a small projection.



FIG. 41.—A one-story house developed in modern style. (*Pasquale Ianneli, architect; photograph by Duncan.*)

A screened porch is a most desirable addition to a house. Its position depends on the use that is to be made of it. A summer breakfast porch needs shelter from the morning sun; a living porch is used largely in the afternoon, and therefore is most comfortable if it is on

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the east side of the house. Front porches have much less privacy than those on the side or back. Avoid the old-fashioned, long, narrow type of porch, where chairs must be placed in a row. Think of a porch as a room, and arrange its proportions so that furniture may be placed conveniently for a group of people. If you wish to add a porch to this house, see that it does not darken the room behind it.

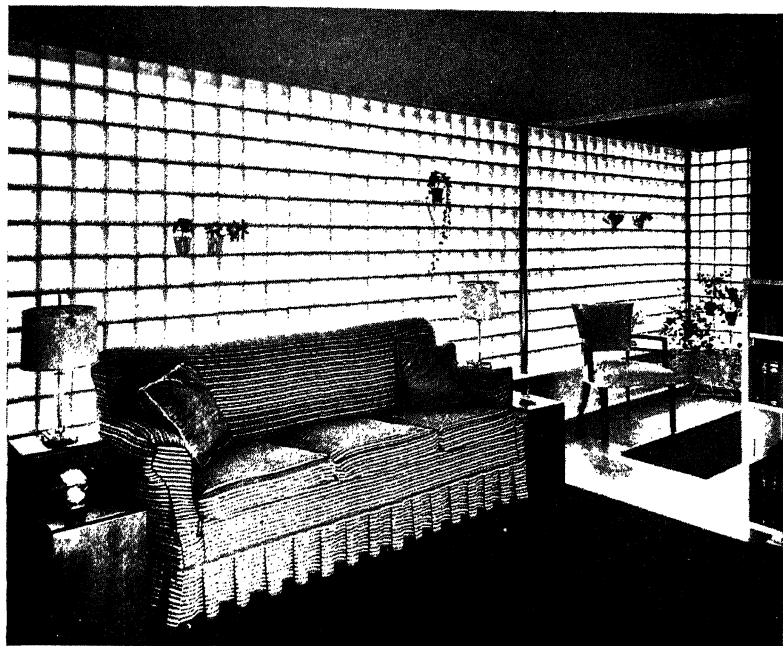


FIG. 42.—The living room of the house shown in Fig. 41. A wall of glass brick shuts out noise from the street.

Complete the plan according to the suggestions in the preceding chapter. Place the windows, the furniture, light switches and outlets, and radiators or registers for the heating system. Draw the plan for the basement if one is to be used.

Drawing the elevations for a house of irregular shape is a rather complicated problem if a sloping roof is used. First, the main mass of the house must be determined. The largest rectangle contained in

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the plan indicates the main mass. The smaller spaces left over from the main mass constitute the projections. First, draw the two elevations of the main mass only, just as if the projections did not exist. Then add the elevations of the secondary masses. Figure 39 shows the two steps to be taken in drawing elevations of this sort. Be sure that the main roof and the roofs over the projections have the same angle. If the projection extends out only a foot or two, the simple and inexpensive treatment shown in Fig. 40 may be used.

An irregular plan lends itself to a number of exterior styles, such as the colonial or Old English or Norman cottage type. A simple version of the Mediterranean style may be used. A modern treatment is shown in Figs. 41 and 42. Use photographs of both old and new houses to guide you in drawing the details. Remember that this is a small, unassuming house. Keep the details small in scale and avoid anything self-conscious or pretentious in the design or the decoration.

SUGGESTIONS FOR STUDY

1. Estimate the cost of the house from the cubic contents.
2. Study a plan, from a magazine, of a one-story house of irregular shape. Determine whether the jogs in outline have been used for additional windows, better room proportions, or just for the effect on the outside.
3. Try new window arrangements on the plan, for better ventilation, sunshine, or a view of the garden.
4. Make a collection of plans and exterior views of one-story houses from various parts of the country. Study the effect of climate on the shape and compactness of the plan; as well as on the exterior design.
5. The placing of registers or radiators for this problem is, of course, only tentative (see Chap. 22). Study booklets from manufacturers of heating systems, and select one for this house. It should be suitable to your local climate and to the cost of the house.

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Planning the Stairway

A ONE-STORY house that contains more than five or six rooms must necessarily be spread out over a large space. Such a house requires, also, a large area of roof and a great deal of foundation wall—two very expensive parts of the house. Building a two-story house is a more economical way of obtaining a larger number of rooms. The stairway from the first to the second floor need not take much extra space, for it may be placed over the basement stairs.

The amount of space needed for a stairway depends on the ceiling height and the dimensions of the individual step. The vertical part of a step is called the riser, and the horizontal part the tread. A simple rule for finding their proper proportions is this: the sum of tread and riser should be $17\frac{1}{2}$ inches, or the average length of an adult's step. If the tread is wide, the riser must be low. If higher risers are used, the tread must be correspondingly shortened. Broad low steps, with, for instance, 12-inch treads and risers $5\frac{1}{2}$ inches high, are easy to climb, but they take so much space that they can be used only in large, expensive houses, where space is not at a premium. Narrow treads and high risers take relatively little space, but they are tiring to climb and dangerous on the descent.

PLANNING THE STAIRWAY

For the small, inexpensive house, therefore, we must strike a balance between these two extremes, with steps that take the smallest possible space without being uncomfortably steep. These requirements are met with a tread 10 inches wide and a riser $7\frac{1}{2}$ inches high. If the stairway must be squeezed up a bit more, the riser may be 8 inches high and the tread $9\frac{1}{2}$ inches wide. Steps in these proportions are the steepest that should be used between the principal floors of a house. Actually, each step is an inch or so wider than the figures

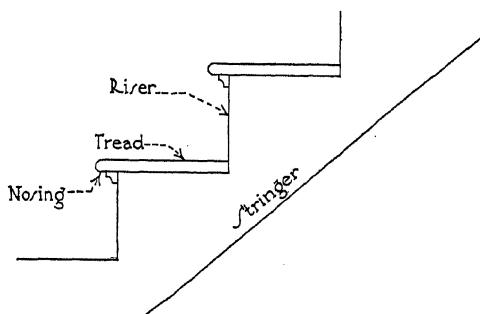


FIG. 43.—Details of stairway.

indicate, for the board that forms the tread projects over the riser (see Fig. 43).

The easiest stairway to plan is a straight run of steps without a landing or a turn, as in Fig. 44. This stairway was planned with $7\frac{1}{2}$ -inch risers and 10-inch treads, for a ceiling 9 feet high. The total height to be climbed is 10 feet, or 120 inches, for it must include approximately 12 inches added by the thickness of the flooring. If 120 inches is divided by $7\frac{1}{2}$, the result is 16, or the number of risers needed. Now, if you will look at the diagram, you will see that the top tread is a part of the second floor. The actual stairway, therefore, has 15 treads. Multiplying the number of treads by the number of inches in each tread (15×10) gives us the total length of the stairway, 150 inches, or $12\frac{1}{2}$ feet. This is the space that must be allowed for the stairway on the plan. The total amount of this space, however, is not entirely taken away from the rest of the house. The basement door

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may be set in a foot or two under the upper end of the stairway, as in Fig. 45, and the flooring upstairs may be built out a corresponding distance over the steps at the bottom, as shown in Fig. 44.

On all first-floor plans the upper end of the stairway may be drawn with dotted lines, for it is above one's head and may be disregarded in planning the first floor. The exact position of the basement

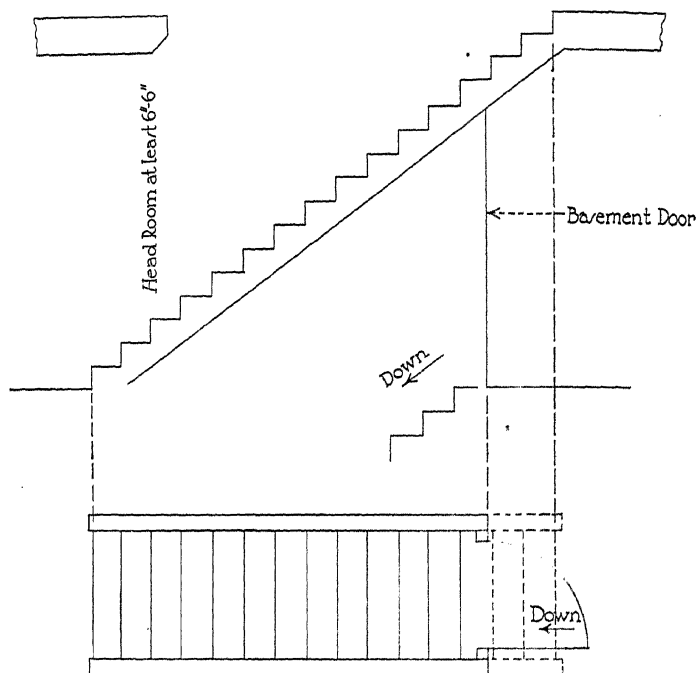


FIG. 44.—Plan and section of straight stairway.

door should be shown on the first-floor plan, as in Fig. 44. On the second-floor plan, the lower end of the stairway may be drawn with dotted lines, and the flooring built out over it.

Ample headroom should be allowed on the stairway, so that in descending not even a tall man will bump his head, and so that furniture may be carried up and down without damaging the plaster.

The stairway may be enclosed between partitions, or, if a hallway runs beside it, the side toward the hall may be open, with a

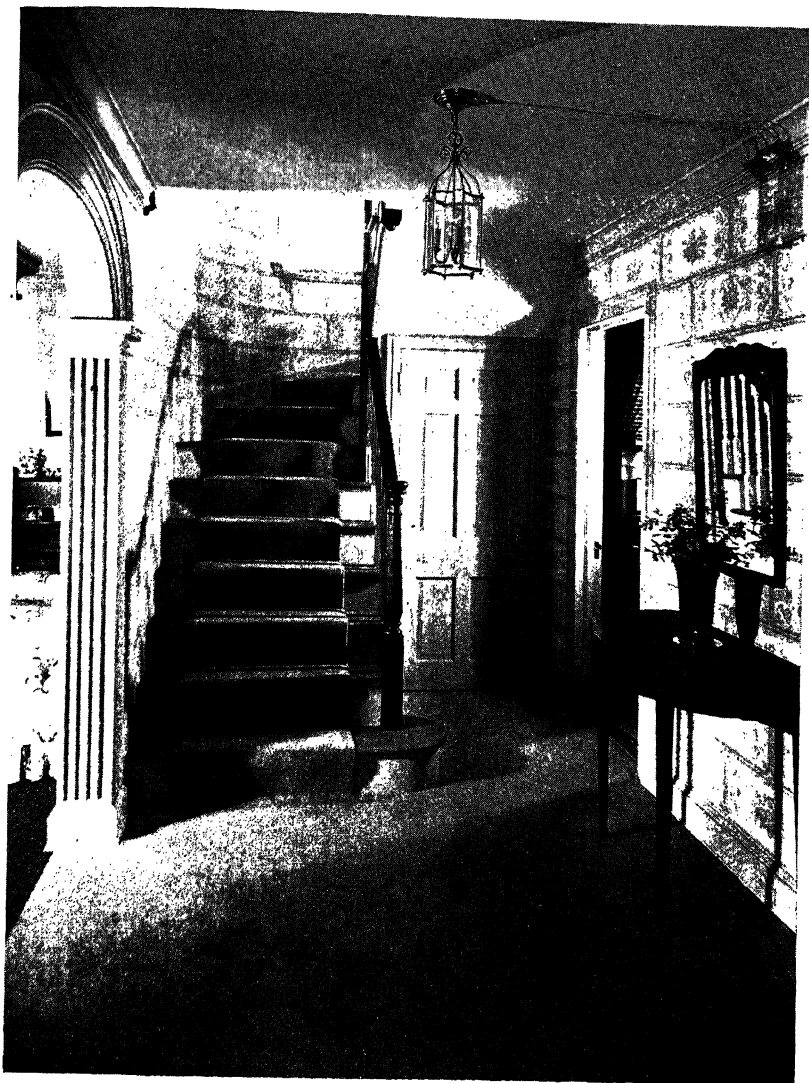


FIG. 45.—The basement door may be set in under the top of the stairway. (Photograph by Richard Averill Smith.)

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banister. Where space is limited, a width of 3 feet is sufficient for a stairway. A handrail should always be provided, both for safety and for protection against finger marks on the walls.

The stairway serves the same purpose as the halls of a house, that is, circulation. Like a hall, it should usually be placed near the center of the plan. The top of the stairway is just as important as the bottom. This means that both floors of a two-story house must be planned together. Often, a stairway fits nicely into the first floor, only to require an excessive amount of hall space upstairs. In certain types of plan the stairway may be placed next to an outside wall. In such cases, it should be placed on the side where it cuts off the least desirable window space. Many people object to placing the foot of the stairway in line with the front door, because the entrance is the most public part of the house and the stairway leads to the rooms that require the most seclusion. It is possible, of course, to arrange a plan so that the stairway cannot be seen from the front door.

Whether the stairway is to be a decorative feature of the house, with wide steps and a carefully designed balustrade, or merely a convenience located between partitions, depends on the size and cost of the house. It is foolish to build an expensive and elaborate stairway in a cottage. A large mansion, however, seems incomplete without a beautiful, dignified stairway.

In many houses the requirements of the plan will not allow the use of a straight stairway, but call for a turn in the direction of the steps, with a landing at the turn. Where the ceiling is high, landings are desirable, to break the long line of the stairway and also to provide a brief rest for the ascent. In a little house with low ceilings, however, the use of landings and turns is a matter of adapting the stairway to the plan and making the best use of the available space. Winders, that is steps on a turn, are sometimes used to save space. This should be avoided wherever possible, for they constitute a daily hazard. If they must be used, it might be wise to put them near the bottom; then, at least, one will not have far to fall.

PLANNING THE STAIRWAY

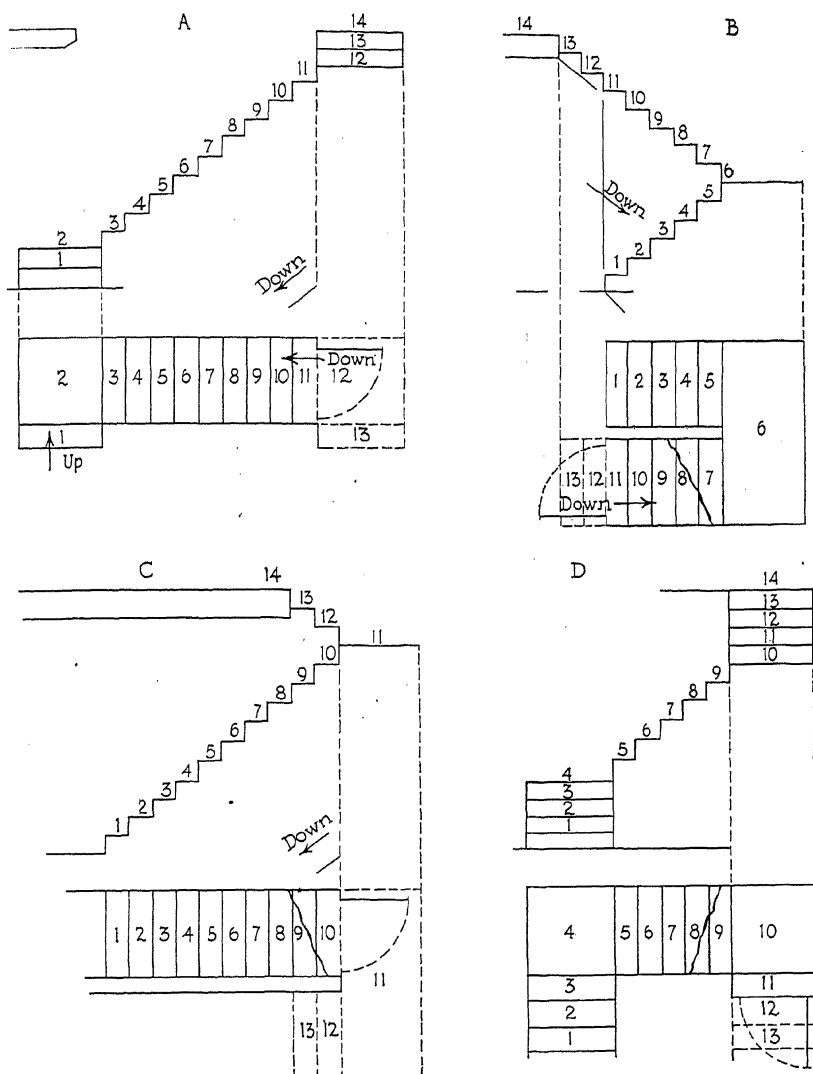


FIG. 46.—Stairways with landings and turns.

PLANNING THE LITTLE HOUSE

The space required for a stairway is about the same, whether a straight run or a turn is used. In a small house with a low ceiling a horizontal length of approximately 10 feet is needed for a straight stairway. If the stairway is broken into two parts with a landing between them, the lengths of the two flights added together should total about 10 feet. The landing, however, is really a widened step,

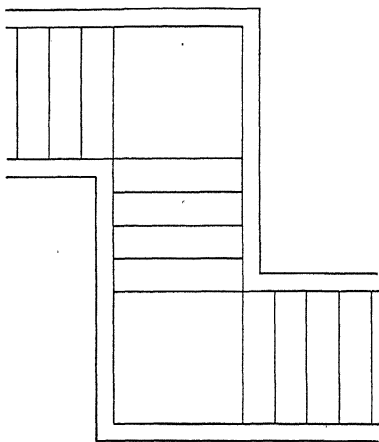


FIG. 47.—A poorly planned stairway.

and should be counted in when the stairway space is estimated. The best way to work out any stairway is to draw a sectional view of it on squared paper, with each step shown in the proper scale. A few commonly used stairways with landings and turns are shown in Fig. 46. Generally speaking, turns on a staircase should be simple and uncomplicated. If two landings are used, the steps should turn both times in the same direction, as in Fig. 46D. A bad example is shown in Fig. 47. The use of such a stairway indicates unskilled or careless planning.

Planning a Two-story House

THE simplest two-story house is one in which a straight stairway is placed across the central part of an oblong plan, as in Fig. 48. An arrangement of this sort is commonly called a colonial plan. It may be adapted to a small house as well as to a large one. The minimum sizes that may be used for this house are also shown in the same drawing. A few feet added to these dimensions will permit greater variety in the arrangement of the interior. The lower end of the stairway may be near the front door, or its position may be reversed, with the ascent starting from the rear of the house.

Using a plain, oblong plan and a straight stairway across the middle, make a plan for a two-story house. The dimensions of the house should not be less than the minimum shown in Fig. 48, or larger than 25 by 35 feet. Of course, much larger houses than that may be built with this general arrangement, but they cannot be classified as little houses. Figure 49 shows a modern use of classical design with a central-stairway plan.

Choose the direction which the house is to face before you start the plan or, better still, find an actual lot for which you may draw the plan. A fairly wide lot, with level or slightly rolling land, is most suitable. The house should stand with a long side facing the street.

PLANNING THE LITTLE HOUSE

If you wish to use an attached garage at one end, a porch may be added to the other end for balance.

Imagine that you are planning this house for a family of four:

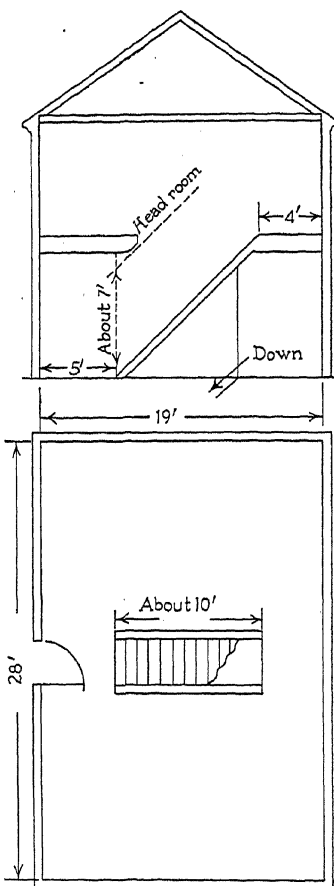


FIG. 48.—A central-stairway plan.

parents and two small children. A house in which children are growing up should be planned to make life pleasant for the children and as easy as possible for their parents. The children should have their own bedrooms and, in addition, a definite place for their daytime activities. A playroom is more useful on the first floor than on the second. When children are small, it permits easy supervision from the kitchen or living room; and when they are older, it may be converted into a study or a music room. A separate entrance to the playroom allows the children to dash in and out of the house to their heart's content without undue wear and tear on the nervous systems of adult members of the family.

If the only back door leads through the kitchen, the housewife's dream of a spotless kitchen floor will be realized only at the expense of constant mopping up. It is possible to plan a back entry leading to the playroom, the kitchen, and the front of the house, with a lavatory and a coat closet near by. That part

of the back yard which is set aside for the children's play should be close to the rear entry.

If the exterior of the house is to be in the formal colonial style, the main entrance should be in the exact center of the front. The

PLANNING A TWO-STORY HOUSE

stairway, however, may be set a few feet to either side of the center, according to the needs of the plan. The use of a narrow hall running beside the stairway from the entrance to the rear of the house is optional. It is almost necessary to omit this hall if a small plan is used.



FIG. 49.—A central-stairway house with a beautiful classical entrance. (*Dwight James Baum, architect; photograph by Gottscho.*)

Divide the space within the house in any way you wish, provided that it is sensible. Wasting space is not sensible. In a small house you cannot have everything. If a large living room is the feature you want most, something else must be sacrificed. If a playroom is added to the rooms on the first floor, either the living room must be smaller, or

PLANNING THE LITTLE HOUSE

the dining room must shrink to the proportion of an alcove. The kitchen should be larger than the minimum size, in order that two

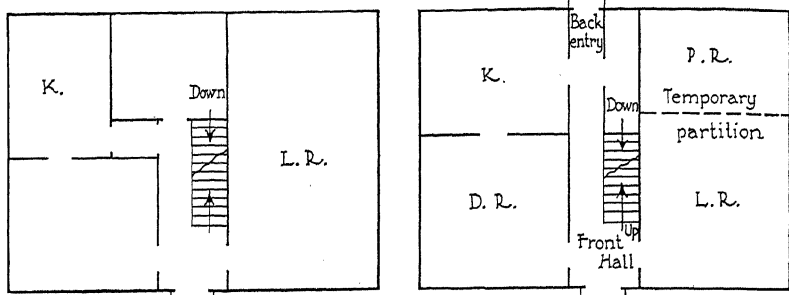


FIG. 50.—Suggested arrangements for four rooms on first floor.

people may work in it at the same time. If there is no playroom on the first floor, space should be allowed in either the kitchen or the dining room for the children's table and chairs. Three downstairs closets should be included in the plan: one for cleaning equipment, another for coats, and a third for the children's toys.

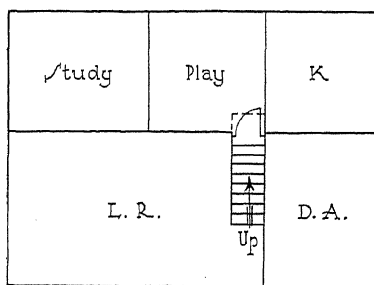


FIG. 51.—Five rooms on first floor.

Unless there is a very good reason for doing otherwise, the basement stairs should be placed under the main stairway. At this point it is necessary to destroy one of the dearest illusions of the amateur house planner. The basement steps take up practically all the space

under the stairway. It is not possible to use part of it for a coat closet or a broom closet or a lavatory. The basement door may be set under the top of the stairway a foot or two, but there must be a clear space directly behind, to provide an approach to it.

It is scarcely advisable to break up the first-floor space into more than four rooms. Two arrangements for the first floor are suggested in Fig. 50. If five rooms are required without adding an extension to the main mass, they may be arranged as in Fig. 51.

PLANNING A TWO-STORY HOUSE

In planning a two-story house you must keep one eye on the second floor while the first is being planned. As soon as a tentative arrangement for the first floor has been made, start on the second. Be sure to keep the stairway in exactly the same position on both plans.

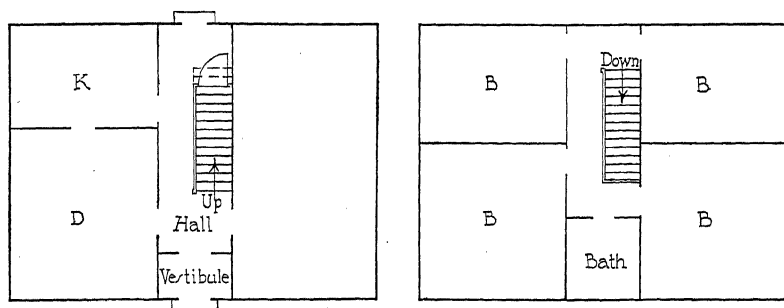


FIG. 52.—Bathroom over front hall.

Wherever it is possible, partitions on the second floor should be placed directly over those on the first. This does not mean, however, that the size and proportions of the bedrooms should be sacrificed for this bit of economy.

The second floor should contain three or four bedrooms and one or two bathrooms, according to the size of the house. The modern tendency is to include a second bathroom, even in small houses. Whenever it can be done without spoiling the plan, the bathrooms should be grouped together, as nearly over the kitchen as possible, to save plumbing costs. Sometimes, however, it is better to spend a little extra money on plumbing in order to obtain the best use of the floor space. In Fig. 52, for instance, the logical position for the bathroom is over the front hall, because the remaining space may then be divided into four corner bedrooms. If the bathroom were placed over the kitchen, only three bedrooms could be provided. Roughly esti-

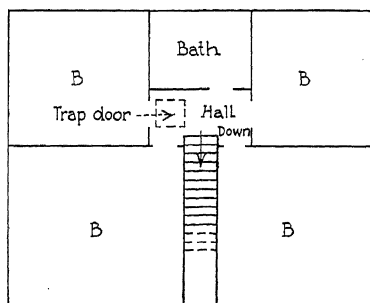


FIG. 53.—Bathrooms in center at back.

PLANNING THE LITTLE HOUSE

mated, houses cost about \$1,000 a room. The fourth bedroom, gained at the cost of an extra plumbing stack, is a bargain. If the stairway has been placed well toward the front of the house, a space large enough for a bathroom may be found between the two back bedrooms, as in Fig. 53.

While the minimum width of 3 feet will do for ordinary halls, the landing at the head of the stairway should never be less than 4 feet wide. All the bedrooms and one bathroom should open into the hall. The first decision to be made in planning the second floor concerns the arrangement of the hallway. Figure 54A shows a U-shaped hall,

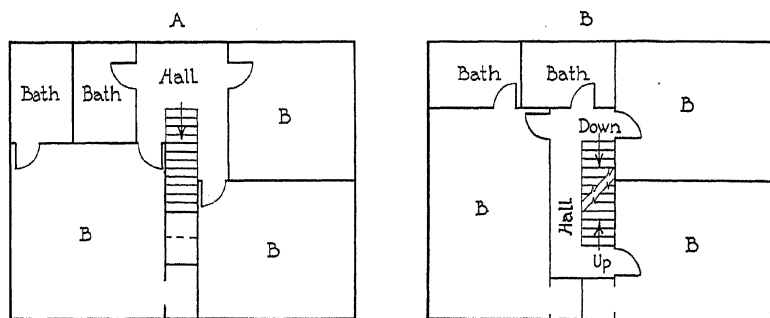


FIG. 54.—Two arrangements of the second-floor hall.

extending just far enough on each side of the stairway to give access to the front bedrooms. The hall in Fig. 54B may be used in large houses where the extra space it takes is not needed for bedrooms or closets, or where a stairway to the third floor is placed directly over the main staircase. Use the arrangement that you think is better for your own plan. If the house is small, a disappearing stairway to the attic may be used, with a trap-door in the hall ceiling.

At least one of the bedrooms should be large enough to accommodate two single beds. One room may be a single bedroom. There must be a closet of appropriate size for each upstairs room. Extra closets opening into the hallway may be used for linen and for cleaning equipment. The problem of providing a closet for each bedroom should not be solved by cutting out corners of rooms, or dodged by

labeling a room "study," "nursery," or "sewing room" because it has no closet.

As soon as you have worked out the main space divisions of the second floor, go back to the first. From this point on, keep both plans before you, working on them alternately. Basic changes in one plan will, no doubt, call for changes in the other. If you move the stairway on one floor, make a corresponding change on the other at once, before you forget it.

Draw the basement plan as soon as the upper floors are finished. The use of oil or gas for the heating plant is justifiable in a house costing as much as this one. Then, the space that would be required for a coalbin may be turned to some other use. If a recreation room is placed directly under the living room, one chimney may provide fireplaces for both rooms. If necessary, the furnace flue may be placed in a second chimney. The expense of two chimneys will not be out of proportion to the total cost of a house of this size, although it is more economical, of course, to make one chimney serve for all the flues in a house.

Next, make a tentative arrangement of the windows on the first- and second-floor plans, and place the furniture. They cannot be definitely placed, of course, until the exterior is drawn. The façade of a colonial house is formally balanced, with the doorway in the center, and one or two windows on each side. Second-floor windows should be centered directly above those of the first floor. If a window is placed above the front door, it is usually the same size as the other windows. A little juggling of the partitions may be necessary in order to fit this window into the plan. It may be omitted in a small house. Try to work out an interesting variety in the space divisions of the front. The wall spaces between the windows should not be exactly the same width as the windows. The placing of the windows is governed to some extent by the design of the doorway you choose for your house. If you wish to use sidelights and a wide porch, allow space for it before placing the windows. It is not always possible to achieve perfect balance on the sides and the back of the house, because

PLANNING THE LITTLE HOUSE

of the partitions and the placing of furniture. Even on the back, however, try to avoid a hit-or-miss arrangement of windows.

Before you start to draw the exterior elevations, read Chap. 17, and study pictures of both old and new colonial houses. The doorway, the windows, and the cornice should be copied from some good example. Original design in colonial details such as these is best left to talented and experienced architects. Three beautiful colonial doorways are shown in Figs. 111, 112, and 113.

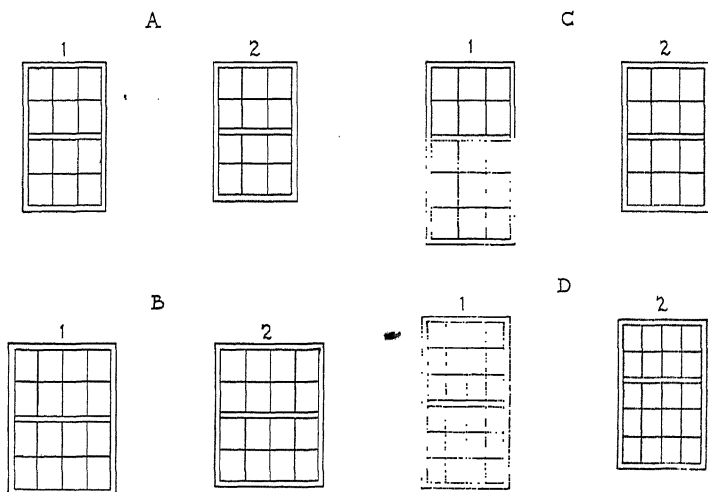


FIG. 55.—Windows for a two-story house.

Draw all four outside elevations of the house if time permits; otherwise, draw the front and one end. The foundation should not extend more than 1 foot above ground. The ceiling height may vary from 8 to 9 feet on the first floor, with the second-floor ceiling a few inches lower than that of the first floor. About 1 foot must be allowed for flooring between.

The slope of the roof depends partly on the type of house you have chosen as a model; the early colonial styles had fairly steep roofs, while the roofs of the late eighteenth century were quite flat. If you wish to use the third-floor space for bedrooms, the roof must, of course,

PLANNING A TWO-STORY HOUSE

be fairly steep, and the style of the house must be chosen accordingly. The cornice should be kept down as close to the second-floor windows as possible.

Sketch in lightly the outlines of all the windows and of the doorway before drawing windowpanes and other details. Second-floor windows are usually made a bit shorter than those of the first floor in order to avoid a top-heavy appearance. When the arrangement of the windows is satisfactory, draw the windowpanes. In all traditional styles, windowpanes are taller than their width. Their size should be approximately uniform throughout the house, regardless of the size of the windows. The problem of achieving a uniform size of windowpanes with the unequal lengths of first- and second-floor windows is a matter for careful study. Figure 55 shows four pairs of windows suitable for colonial houses. In each pair, the window marked 1 is meant for the first floor, and 2 for the second. Figure 55A shows two standard windows. In B the divisions are adjusted to the extreme width of the window, in order to keep the windowpanes vertical. In both A and B the difference in length between first- and second-floor windows is not great enough to require any change in the windowpanes. A difference of an inch or two in their length is not noticeable. In C and D, however, the first-floor windows are so much longer than those of the second floor that a rearrangement of the space divisions is essential, in order to keep the panes uniform. The smaller windowpanes of D are suitable for earlier types of the colonial house, such as the Pilgrim or Pennsylvanian.

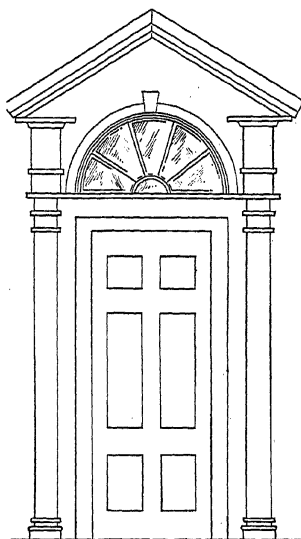


FIG. 56.—A colonial doorway.

Figure 56 shows a simple drawing of a colonial doorway. It is not necessary in the sketch that you are making to repeat every line

PLANNING THE LITTLE HOUSE

of the doorway details shown in the photographs. The proportions of the columns or pilasters, the moldings, and the pediment, however, should be estimated and copied with care.

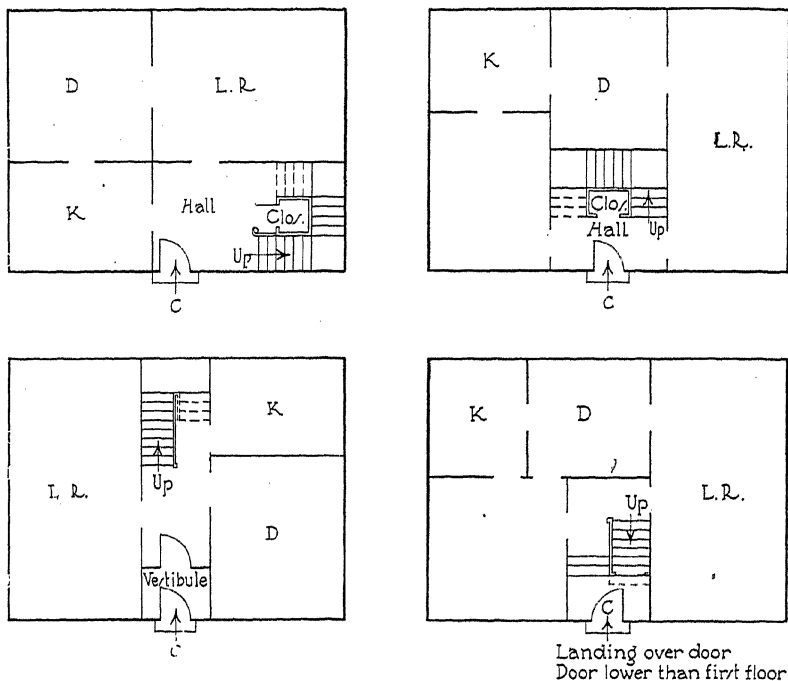


FIG. 57.—Variations of the colonial plan.

Finish the drawings in color, with foundation planting, as in earlier problems. Estimate the cost of this house from the cubic contents. Figure 57 shows some variations of the plan that may be used with the formally balanced façade of the colonial house.

SUGGESTIONS FOR STUDY

1. Assuming that there is no basement under the house you have just planned, redraw the first floor to include a heater room, a laundry, and storage space. A service wing may be added at the side.
2. Select a suitable heating system for the house, and make a tentative arrangement of the radiators or registers.

PLANNING A TWO-STORY HOUSE

3. Place light switches, lamp and convenience outlets, and light fixtures on the plan (see Chap. 24).

4. Study the houses of colonial style in your city, comparing them with the old houses illustrated in this and other books (see reading references, page 190).

4. Make a sketch of a poorly designed colonial house in your city, or select a picture of one. Draw elevations for a new exterior that is better in design.

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The Square House

THE square two-story house has been looked upon with disfavor because of its monotonous proportions and consequent boxlike appearance. Its compact shape, however, makes it economical to build and to heat. For that reason, the square house has always been popular, especially with people who consider appearance less

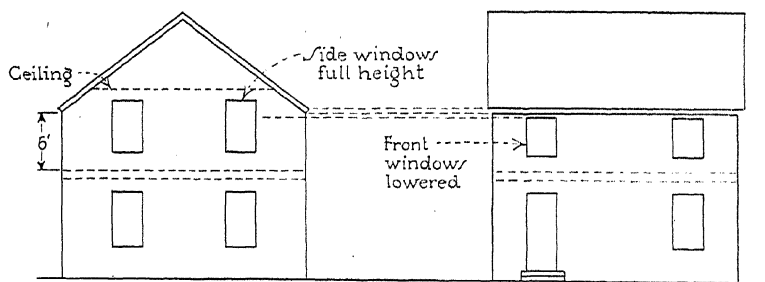


FIG. 58.—A lowered roof improves the proportions of the square house.

important than economy. Perhaps that is the reason why many square houses are so homely. They must have been built by people who believed that beauty of design was some costly extra for which they had no margin, and consequently overlooked the possibilities of simplicity, good proportions, and interesting space division. These things call for time and taste, not dollars. The spirit of rigid economy,

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however, is not the most fertile soil for the growth of beauty. There are some occasions when one must have the courage to invest a few dollars in some feature of construction that yields no return in space

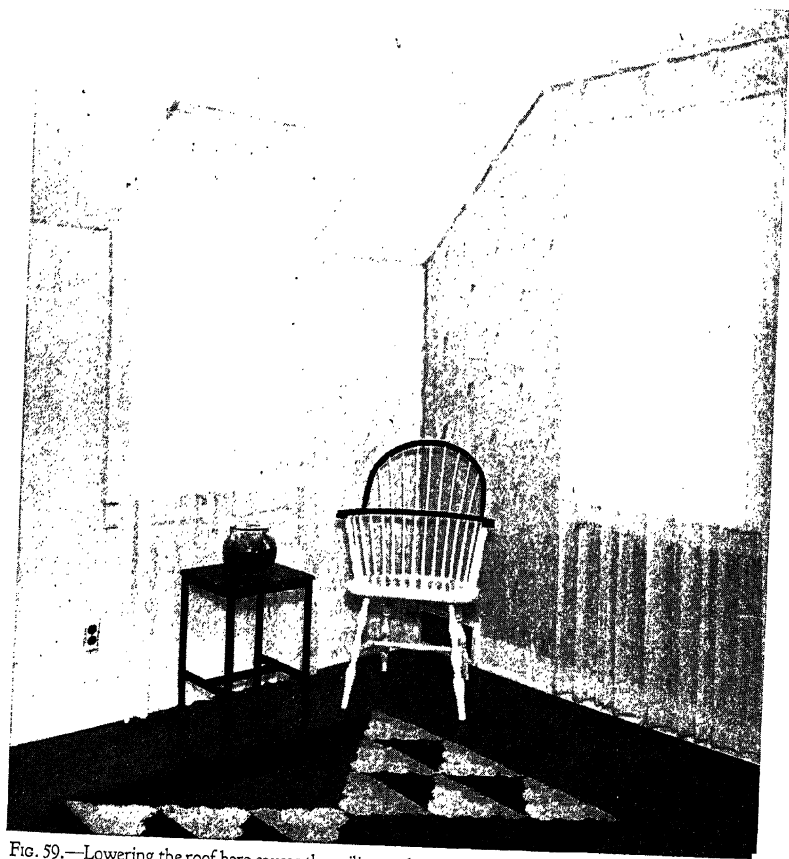


FIG. 59.—Lowering the roof here causes the ceiling to drop to a height of about 5 feet at the side walls

or convenience. The only reward is the deep satisfaction derived from knowing that the house is good to look upon.

There is very little use in condemning the square house because it may be inartistic. The better course is to face the fact that it is here

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to stay, and to consider how its handicap of poor proportion may be overcome. The chief trouble is that such a house is too tall for its width. When the vertical lines of a house are dominant, they are in direct opposition to the horizontal lines of the ground, and they give the house a tall, uncomfortable look. In a long house, the dominant

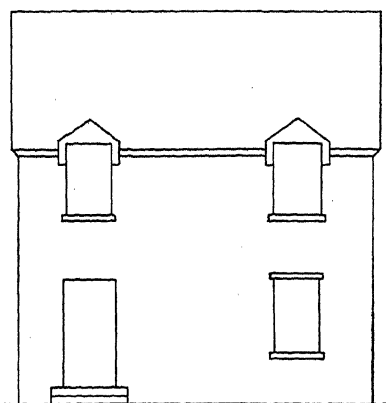


FIG. 60.—Windows breaking through roof edge.

lines are horizontal and in harmony with the ground. They contribute to a desirable feeling of permanence and of belonging to the site. In making the best of the square house, two things may be done. The actual height may be cut down wherever it is possible, and optical illusions may be used to make the house seem wider than it really is.

The height may be reduced in three places: the foundation, the ceiling heights, and the roof. Of course, the foundation of every little house should be kept low, but in the square house this is especially necessary. A ceiling height of not more than 8 feet on the first floor and of 7½ feet, on the second, may be used. The roof may be set 2 or 3 feet lower than the full two-story height, as shown in Fig. 58. If this is done, the ceiling of the second story will have a small but unobjectionable slope at the eaves (see Fig. 59). No floor space will be lost, and there will be nothing to interfere with the placing of ordinary furniture.

With the lowered roof, the second-floor windows at the eaves may be treated in either of two ways. The simpler and less expensive method is to set the windows below the roof edge, with their sills close to the floor. If, however, one wishes to place them at the usual height, they may be treated as dormers, cutting through the edge of the roof, as shown in Figs. 60 and 61. The latter method calls for more complicated and, therefore, more expensive construction. It also

THE SQUARE HOUSE

involves the use of extra downspouts or of a rain gutter running across windows.

When a gable roof is used, the windows in the gable ends, of course, should be of the standard height (see Fig. 58). With a hip roof the ceilings slope on all four sides of the house and some, at least, of the upstairs windows should be treated as dormers, in order to bring them



FIG. 61.—Windows break the roof edge in this variation of the square plan. (*Charles Bowers, architect.*)

up to full height. Windows in a hall or a bathroom may be set below the roof edge for the sake of economy. The treatment of windows in connection with a lowered hip roof is shown in Fig. 62.

To give an illusion of greater width, horizontal lines in cornice, entrance, and windows may be emphasized. Shutters and prominent lintels and window sills contribute toward a horizontal feeling. Vertical lines should be eliminated or, at least, broken up and made inconspicuous. Any sort of decoration at the corners, for instance, will hem in the front and make it seem narrower. Spacing the windows as

PLANNING THE LITTLE HOUSE

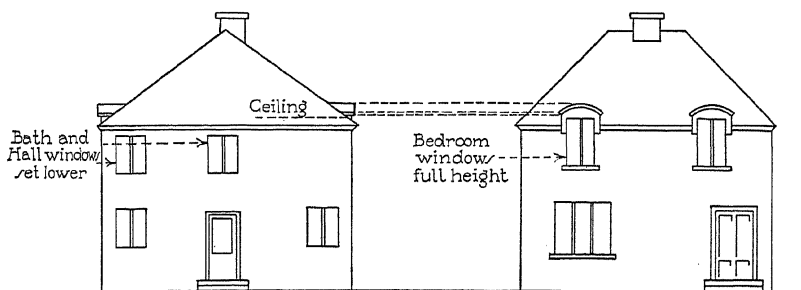


FIG. 62.—A hip roof on a square house.

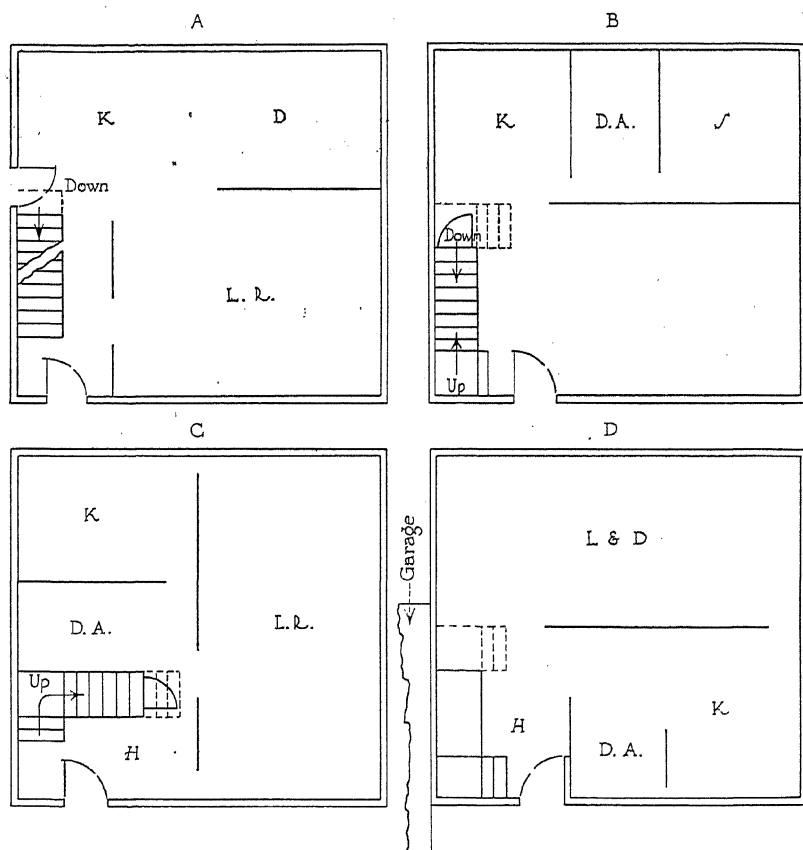


FIG. 63.—Suggested first-floor arrangements for a square house.

far to the sides as the plan allows will make the house seem wider. On the other hand, grouping them close together in the center of the house gives the façade a narrow, pinched look.

All projections or later additions, such as porches, garages, etc., should be placed at the sides rather than the front or back, to help in giving width to the house.

Using one of the arrangements of space and stairway suggested in Fig. 63, make a plan for a two-story square house, with the entrance and stairs at one side of the front. The plan should be from 23 to 27 feet square. Variations of a few feet in either dimension may be made as the plan develops. Several arrangements of living room, dining room, and kitchen are shown in the four plans of Fig. 63. Closets and a lavatory or a dining alcove may be tucked into any small spaces that are left over. If you wish to do something different from the conventional arrangement, place the living and dining rooms at the back and the kitchen at the front—a sensible procedure in many instances.

There may be a separate entrance hall, or the front door and the stairway may both open directly into the living room. The advantage of a large living room extending across the front is offset by its lack of privacy and by the likelihood of drafts from the stairway. The living and dining rooms may be thrown together to make one large room extending through the house from front to back.

Variations in the stairway are shown in Fig. 63. If a landing is used, it may be placed near enough to the bottom to allow for the use of the space above it on the second floor. Or the landing may be placed near the top, so that one may walk under it on the first floor. Often, both these landings are combined in one stairway. Figure 63B shows a stairway of this kind, with the lower landing formed by the second tread, and the upper one at the level of about the twelfth step.

The basement stairs should, of course, be placed under the main staircase. The service entrance is usually on the side of the house, near the basement door. In this position, it serves as a convenient exit from the basement as well as the first floor. If it is near the kitchen also, no other service door will be needed.

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On the second floor there should be three bedrooms and one or two baths. Several possible divisions of the second-floor space are shown in Fig. 64. If there are two bedrooms across the front, the one

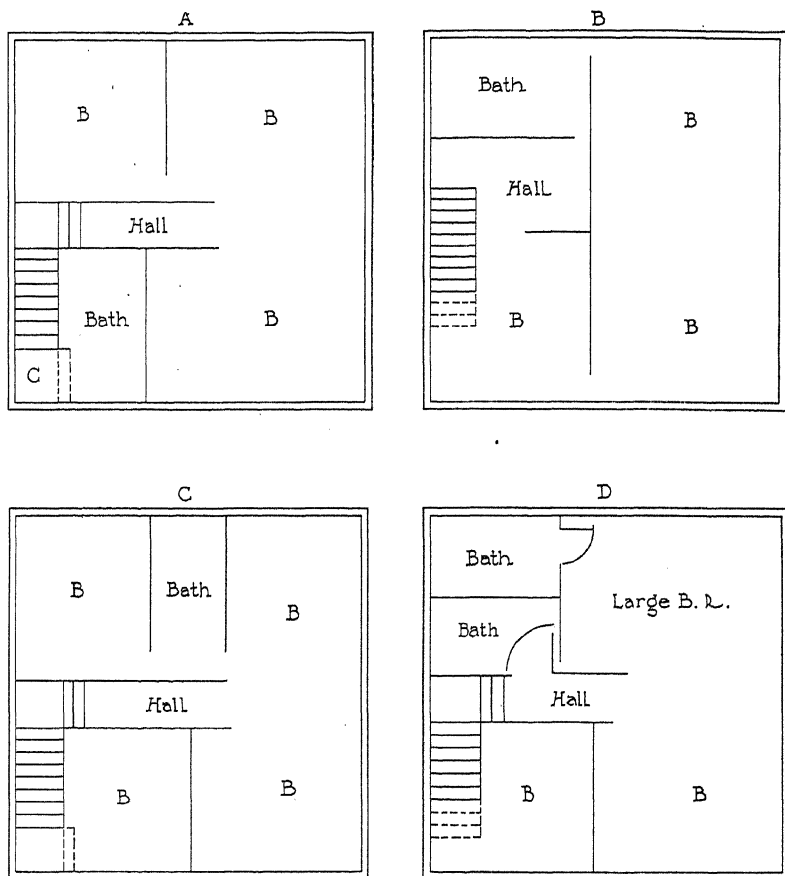


FIG. 64.—Second-floor space divisions.

nearer the stairway should be the smaller, in order to save hall space. Whether the bathroom is placed on the back of the house or over the front hall depends partly on which way the house faces. If, for instance, the front is toward the north, it would be better to place

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the bathroom on the front, even though it costs more, so as to have south bedrooms.

If the living room is to have a fireplace, one chimney should serve for both furnace and fireplace flues. A centrally placed chimney is a challenge to one's ingenuity in working out the second-floor plan. After the first and second floors are finished, plan the basement.

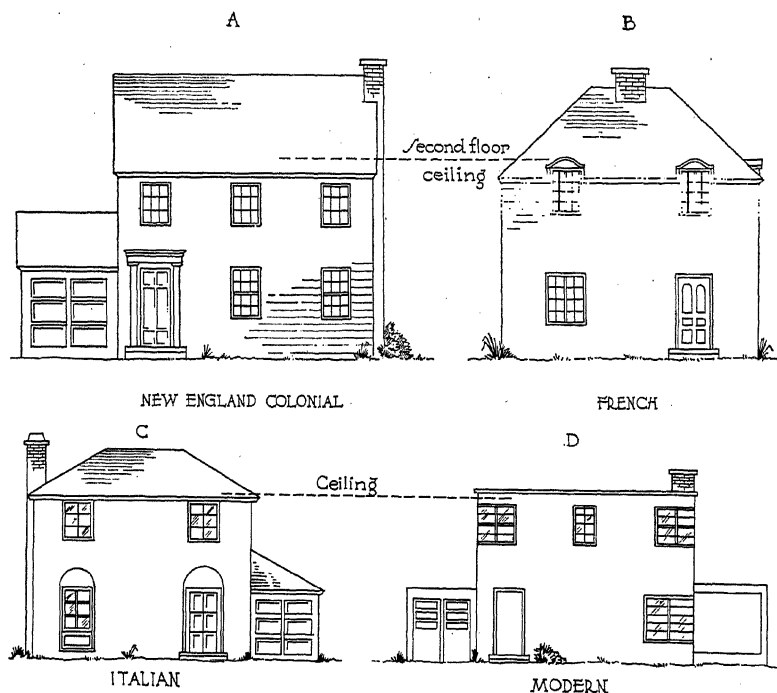


FIG. 65.—Exterior designs for square house.

A number of styles may be adapted to the exterior of the square house (see Fig. 65). Perhaps it is at its best in the simple New England colonial manner, with a plain gable roof and shuttered windows. The Regency or the Norman style may be used, instead. The use of second-floor windows cutting through the edge of the roof is typical of the Norman house, as shown in Fig. 61. Figure 66 pictures a dignified

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FIG. 66.—A modern classic version of the square house. (*Dwight James Baum, architect; photograph by Gottscho.*)

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modern classic development of a square house. The flat roof and simple contours of the modern style, also, may be adapted to the exterior of this plan.

The square house is by its very nature a simple, unpretentious structure. Attempts to dress it up or to make it more imposing are likely to make it ridiculous. It should be treated frankly as a two-story house, not as a cottage with false strips of roofing down the sides and large top-heavy dormers. Nor is it desirable to trim the exterior with gables and half-timber work in the manner of an old English cottage, because it lacks the long, low proportions and irregular shape of that style.

Study as many square houses as you can find, both in pictures and on the streets of your city, before you draw the exterior. Choose the style you like best. Remember that this is a small house, and that the windows, cornice, and doorway detail should be correspondingly small in scale. You will find the front of this house more difficult to arrange than one with the door in the center and windows formally balanced. Do not make the doorway too heavy or elaborate in design. Use rectangles cut from paper to represent windows and doors, and try them in different positions before you draw them. It is usually desirable to have the second-floor windows formally balanced, even though the openings on the first floor are not. The number of windows used on the front depends on the direction toward which the house faces, as well as on the direction of the best outlook.

SUGGESTIONS FOR STUDY

1. Plan the basement for your square house, or include the heater room and the laundry in the first-floor plan.
2. Make a tentative plan for the heating system.
3. Place light fixtures and electrical outlets.
4. Study catalogues of light fixtures or visit stores where they are carried in stock. Select several fixtures that comply with modern requirements for good lighting.
5. Study the square two-story houses in your city, noting ways in which the proportions and effect of height have been dealt with.

The Story-and-a-half House

1 • A CENTRAL-STAIRWAY PLAN

SINCE the early years of the twentieth century a tremendous rise in building costs has brought about a marked decrease in the size of houses. The same amount of money that in 1900 built a large two-story house is now barely sufficient for a little cottage. In

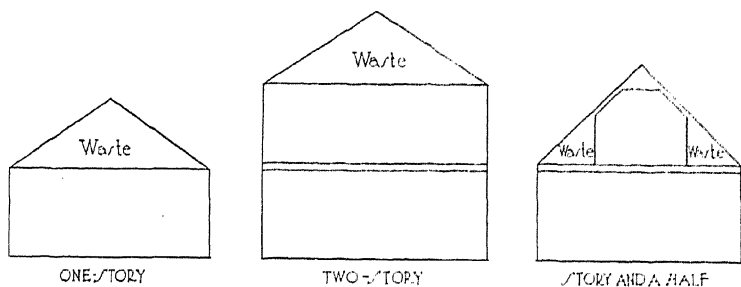


FIG. 67.—Waste space in various types of house.

the old days, space was cheap, and large rooms, high ceilings, and huge attics were a matter of course. Today space is dear; the dimensions and the number of rooms must be cut down, with not a square inch wasted. A large attic, serving no other purpose than to hold a miscellaneous collection of discarded belongings, must be looked upon as waste space. A smaller amount of storage space, in the form of

THE STORY-AND-A-HALF HOUSE

conveniently placed closets, is much more valuable than the large half-empty space in the old-fashioned attic. While it cannot be claimed that any story-and-a-half house is less expensive to build than equivalent room areas in either one-story or two-story plans, certain types of small houses fit neatly and economically into the story-and-a-half form. Figure 67 shows the difference in the amount of space that is wasted in each of these three types. (The flat-roofed modern house, of course, uses 100 per cent of the space enclosed.)

The most important contribution to the modern use of the story-and-a-half house has been the development of insulating materials. These are made from such varied natural sources as cork, cornstalks, seaweed, rock, and wood fiber. They are all useful for the same reason: their loose, rather spongy textures enclose many small dead air spaces, which are poor conductors of heat. Another insulating material consists of highly polished metal foil, which insulates by reflecting radiant heat waves. Old-fashioned roofs, which let in the heat of the summer sun as well as winter's cold, made the space directly beneath them unbearable for living. A ventilated attic was necessary, as a buffer state between the lower floors and the outside temperature. Now, however, roofs may be lined with some insulating material, and the space formerly wasted may be made into rooms. In addition to keeping rooms cool in summer, insulation reduces the cost of heating the house in winter.

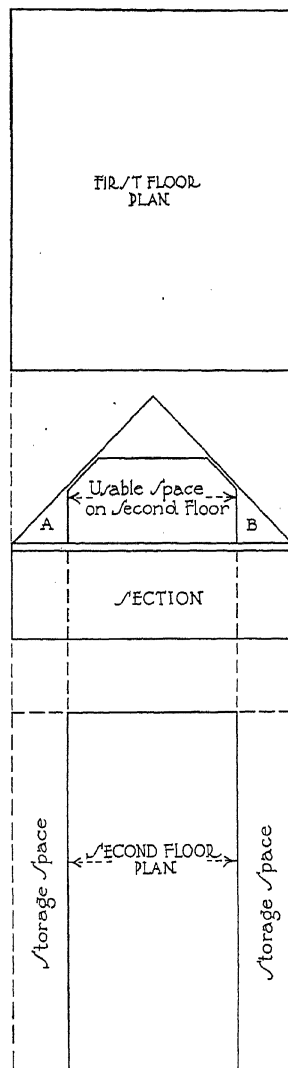


FIG. 68. —Steps in drawing plans of a story-and-a-half house.

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Other factors that have contributed to the shrinking of the American house are the increasing difficulty of finding servants, the smaller families of today, and a general tendency to seek diversion and social activities away from the home. Club memberships, hotel entertaining, motorcars, and the movies, all take money that might otherwise be spent on the house. Moreover, it is interesting to notice that cottage styles borrowed from England, Normandy, and colonial America, have been immensely popular in late years, for other reasons

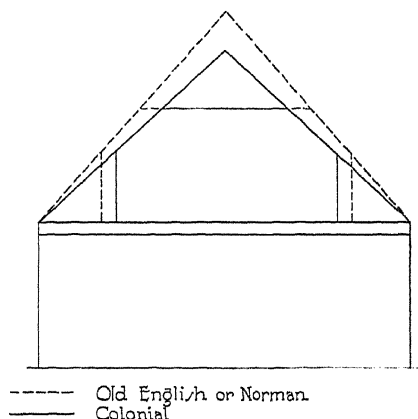


FIG. 69.—Comparative roof slopes.

than economy. Many large, costly houses are being built in a low, rambling form, to look like cottages. A half-century ago, people of wealth and social position would have built themselves tall, imposing mansions, with cupolas and swelling bay windows. It is evident that today people like the cottage style for its own sake.

The simplest plan for a story-and-a-half house is similar to that of the first two-story-house problem: an oblong plan with a straight stairway across the central part. Using this arrangement in a plain rectangle, about 24 by 32 feet, make a plan for a story-and-a-half house. Divide the first-floor space in any way you wish, but keep the stairway well toward the front. It may be desirable to provide a bedroom and a bath or a lavatory on the first floor, since the second-floor space is limited.

THE STORY-AND-A-HALF HOUSE

When the first floor has been tentatively laid out, the usable space upstairs must be determined. To establish this, it is necessary to draw a section through the house, based upon the first-floor plan (see

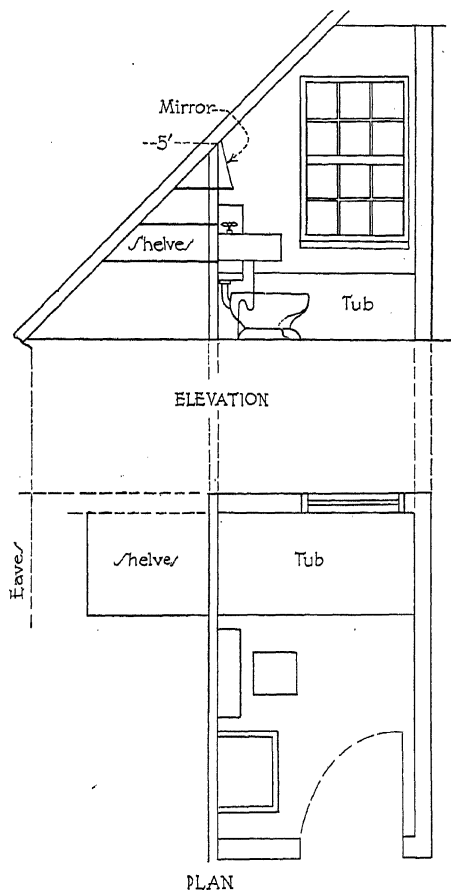


Fig. 70.—A bathroom in minimum space under a sloping roof.

Fig. 68). Use the inside measurements of the house, in order that the exact amount of headroom on the second floor may be seen. The slope of the roof depends upon the style of the house. On a colonial cottage the roof should not be steeper than a 45-degree angle, and it could

PLANNING THE LITTLE HOUSE

very well be less. A copy of an old English or Norman cottage may have a slightly more pointed roof. An extremely steep roof is wasteful of material and suggests affectation in design. A very flat roof, of course, cannot be used for this type of house. Figure 69 shows the difference between the slopes of colonial and old English roofs.

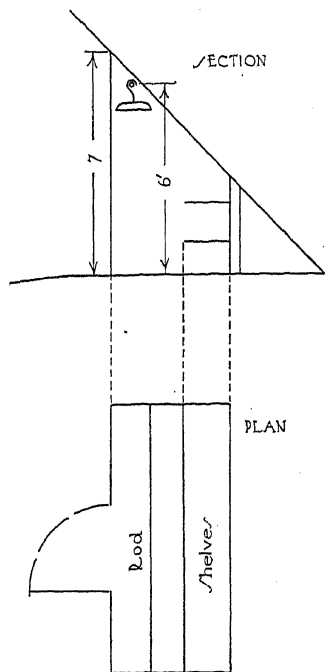


FIG. 71.—A bedroom closet under a sloping roof.

Naturally, the steeper roof, as shown by the dotted line, permits slightly larger rooms on the second floor.

Sketch lightly several roof slants and choose the one you like best. Then draw the line of the ceiling, 8 feet high in the center, sloping down to a height of about 5 feet at the sides. A slope of this sort may be used without interfering with headroom or the arrangement of ordinary furniture. It is not practical, however, to run the slope much lower than 5 feet from the floor. The little triangular spaces near the eaves, marked A and B on Fig. 68 should be used for storage.

The second-floor plan may then be drawn from the sectional view of the house, as shown in Fig. 68. The full width of the first floor should always be indicated on the second-floor plan by a dotted line. Great care must be taken to place the stairway in exactly the same position on each plan. There is not much chance for variety in the arrangement of the second floor. There should be two bedrooms, one on each side of the stairway. A part of the bedroom over the kitchen side of the first floor may be cut off and used for a bathroom or a lavatory. Figure 70 shows the best arrangement for the fixtures when the bathroom must be crowded into the minimum space under a sloping roof. A mirror above the washbowl may be set at a slant.

THE STORY-AND-A-HALF HOUSE

While the low space under the roof will do for storage, it is not tall enough for hanging up clothing. This space may be made suitable for a clothes closet by moving in the partition a foot or two, as in Fig. 71.

Additional windows for the second floor may be provided in the form of dormers (see Fig. 72). One must remember, however, that dormer windows cut into the roof are more expensive than windows

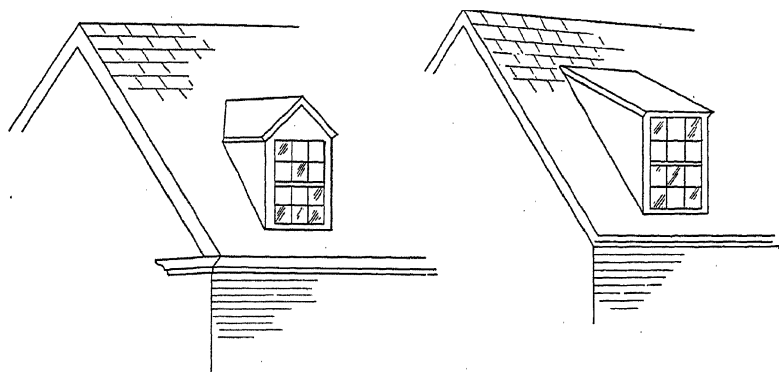


FIG. 72.—Dormer windows.

in the gable ends of the house, and should be used where they contribute the best light and ventilation. (South dormers, for instance, are more desirable than north ones.) In every case, dormers should be simple and unobtrusive in design. Their windows should be smaller than those of the first floor.

If additional floor space is needed on the second floor, a shed dormer may be added at the back. The dormer should first be drawn on the sectional view of the house, and then on the plan, as in Fig. 73. A shed dormer adds floor space and headroom as well as window space, but these advantages must not be gained at the expense of the exterior appearance of the house. Dormers of this kind are not really typical of the old cottage styles, either American or European. They are, at best, a compromise between traditional design and modern demands for more light and ventilation in the bedrooms.

PLANNING THE LITTLE HOUSE

A dormer is only a detail and should be small enough to be subordinate to the main roof. It should not extend out to the edge of the roof at the bottom, nor up to the ridgepole at the top. Above

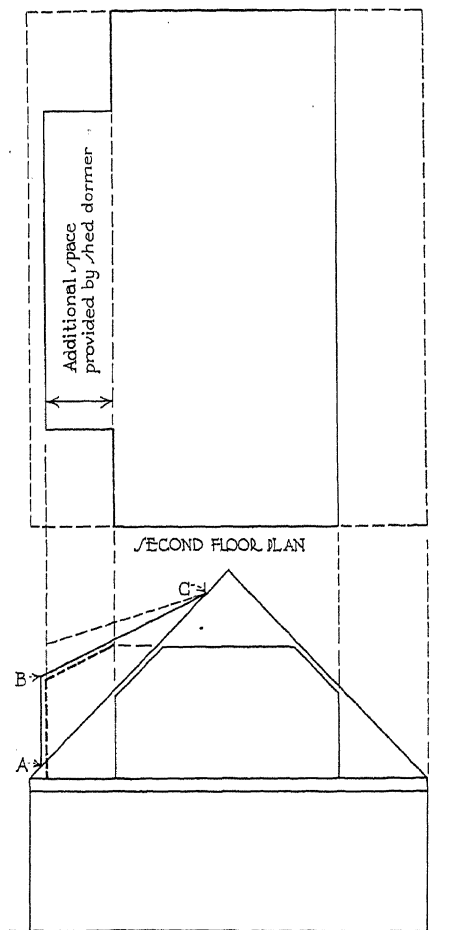


FIG. 73.—A shed dormer.

all, it should not stand up too tall. In Fig. 73, A, B, and C, are shown the three points one must watch in drawing a shed dormer. In order to keep the dormer low enough, it is necessary to have the ceiling slope

THE STORY-AND-A-HALF HOUSE

down into it, as shown by the heavy dotted line. The light dotted line shows how very bulky a dormer would have to be in order to keep the ceiling its full height.

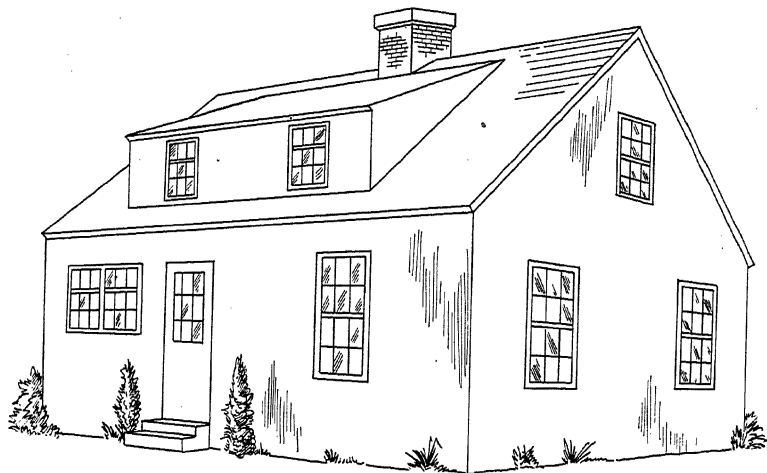


FIG. 74A.—A small dormer, subordinate to the main mass.

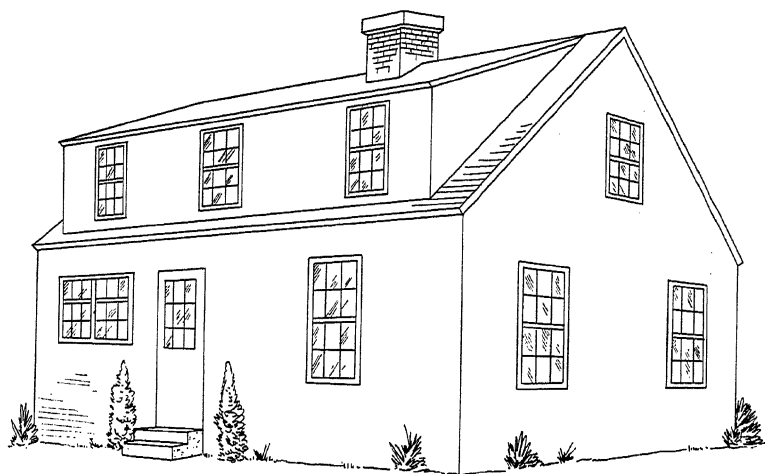


FIG. 74B.—An over-size dormer dominates the house.

The length of a shed dormer should be considerably less than the length of the house itself in order to establish the dominance of the

PLANNING THE LITTLE HOUSE

main roof. That is, the strip of roof that runs down at each end of the dormer should be at least 5 feet wide. Figure 74A shows a house with a dormer of moderate size. In 74B, the house itself is lost

beneath an oversize dormer. The extra floor space gained by the use of the larger dormer is not sufficient compensation for spoiling the appearance of the house. If so much floor space upstairs is essential, it would be better to build a two-story house. The extra windows made possible by a shed dormer should be used to give cross ventilation to the bedrooms. The dormer space should not be filled up with closets.

If the exterior of this house is to be developed as a simple colonial cottage, as in Figs. 32 and 116, walls of siding or shingles, in gray or white, may be used. Small-paned, double-hung windows, shutters, and an unassuming doorway, are appropriate (see Chap. 17, Part 3). If the roof is too steep for a colonial cottage,

FIG. 75.—A story-and-a-half house in a square plan.

light stucco walls, casement windows, and dark trim will suggest the English cottage style.

2 • A SQUARE PLAN

A very small story-and-a-half house may be developed from the square plan of Chap. 10. The house may be from 20 to 25 feet square. Any of the stairways shown in Fig. 63 may be used, excepting C which divides the second-floor space inconveniently for a story-and-

a-half house. Figure 75 shows another stairway that is especially useful. The landing is on the fourth or fifth step and the upper flight makes use of the slope of the roof for headroom.

The first floor may include living room, dining room, and kitchen, or, if you prefer, the first two may be combined, and a small study or a



FIG. 76.—A story-and-a-half house built on a square plan. (Courtesy of Realty Associates, Brooklyn, N. Y.)

bedroom may be added to the first floor in place of the dining room. One or two bedrooms may be placed on the second floor, depending on the size of the plan. A small shed dormer may be used on the back of the house, and, if the extra cost is justified by the view or a desirable exposure, two single dormers may be added on the front.

If a basement is used under this house, the space not needed for the laundry and the heating system should be made into rooms, to

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supplement the limited space upstairs. If no basement is used, the laundry and heating plant should be included in the first-floor plan.

The exterior may be treated in any way consistent with the slope of the roof and the materials used in construction. The house is so small that decoration of any sort must be used with great restraint. Figure 76 shows a small colonial cottage built on a square plan.

SUGGESTIONS FOR STUDY

1. Using the square plan of part two as the initial step in building, plan for the addition of two rooms to the first floor.
2. Select a picture and plans of a story-and-a-half house with excessively large shed dormers. Redraw the second-floor plans, with dormers of reasonable size.
3. Make a study of the cost of plumbing fixtures for a small house, at three price levels: minimum, average, and high. See Chap. 23.

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The Story-and-a-half House, Other Plans

WE HAVE seen that, in a story-and-a-half house with a gable roof, a strip of space about 5 feet wide must be lost from each side of the second floor. If there is to be adequate room space between these strips, the first floor must be suffi-

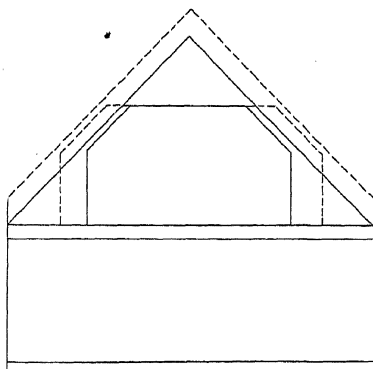


FIG. 77.—The position of the roof affects the size of the second floor.

ciently wide. It is not practical to use a long narrow plan if you want to make the best use of the space on the second floor. The placing of the roof, of course, determines the usable space upstairs. In the

PLANNING THE LITTLE HOUSE

plans of the foregoing chapter, the slope of the roof started at the level of the floor; it is possible, however, to set the roof a foot or two higher than that, with a consequent gain in space. In Fig. 77 the dotted line indicates a roof starting a few feet above the floor, not high enough, however, to produce a two-story house. In the following problems, use your own judgment as to the placing of the roof.

In a house of irregular shape, the main mass of the house should be large enough to furnish the bulk of the second-floor space, as shown

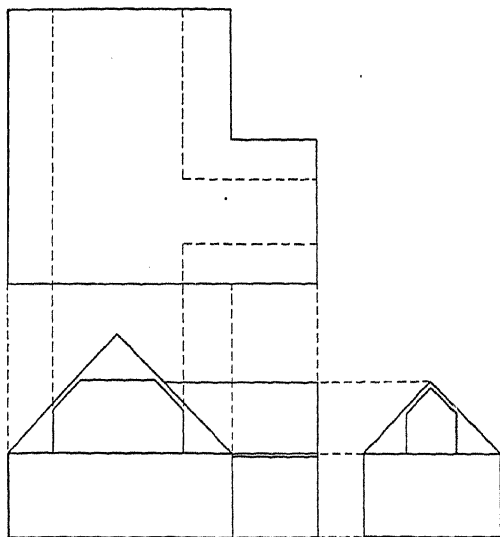


FIG. 78.—The main mass furnishes the major part of the second-floor space.

in Fig. 78. Here the bedrooms and bath are placed in the larger part, and the space above the projection furnishes an attic or, at most, a tiny room. In the L-shaped house of Fig. 79, neither part is wide enough to provide room space upstairs. To be sure, the second floor may be enlarged by means of huge dormers, but we have seen that they are disfiguring to the exterior.

In planning a story-and-a-half house of irregular shape, it is best to begin with a plain rectangle of ample size, to represent the main

THE STORY-AND-A-HALF HOUSE, OTHER PLANS

mass, and to place the stairway in the best relation to it. Projections may then be added to the plan where extra space is needed.

In this type of house, the placing of the stairway presents a triple problem. It must fit into the first-floor plan; on the second floor

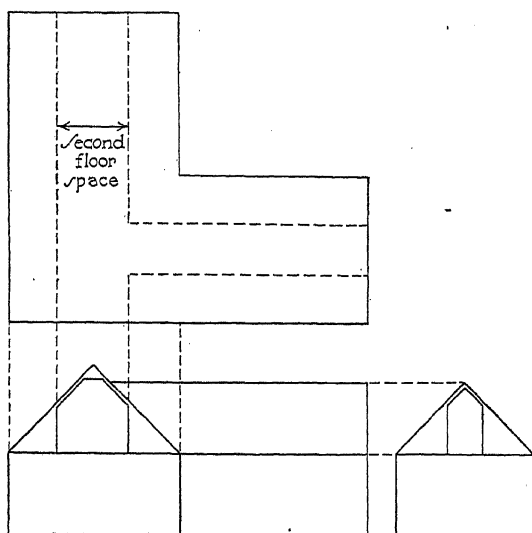


FIG. 79.—Neither part wide enough for use of the second floor.

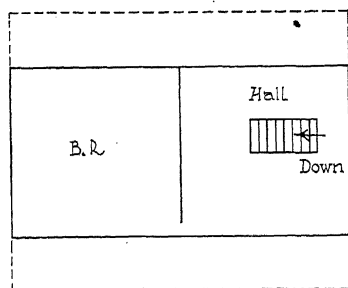
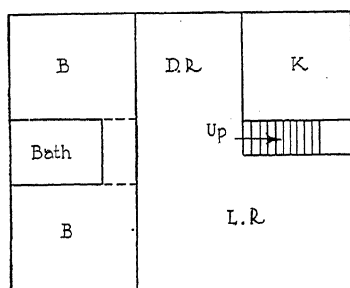


FIG. 80.—The position of the stairway lessens the usefulness of the second floor.

it must come up under the high part of the roof or, at least, in a logical place for a dormer or a gable; it must also divide the second-floor space into proper room sizes. Thus, a stairway placed as in Fig. 80

PLANNING THE LITTLE HOUSE

may fit very well into the first floor, but on the second it cuts one-half the usable space into two narrow strips, making possible only one bedroom. If our full money's worth is to be obtained from a plan of this size, there should be two bedrooms upstairs, although one of them may be quite small. Figure 81 shows several stairways that are adaptable to the story-and-a-half house.

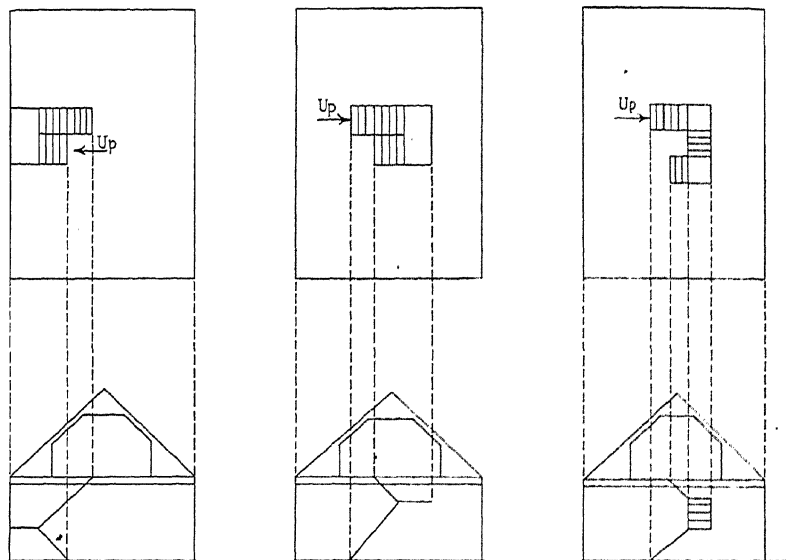


FIG. 81.—Stairways that may be used in a story-and-a-half house.

On the second floor, the gable ends supply the most economical window space, for dormers cut into the roof cost more than windows built in a side wall. For that reason, the stairway should be kept near the central part of the plan, instead of at one end. An exception to this rule is found in the small square house. See page 116. It will be found that in many houses of irregular shape, the best position for the stairway is across the center of the main mass, as in the plan of the first story-and-a-half house discussed.

So far it has been assumed that a gable roof, with a slope of approximately 45 degrees, is used for all the story-and-a-half houses.

THE STORY-AND-A-HALF HOUSE, OTHER PLANS

Such a roof is the most economical, for it allows the maximum floor space upstairs. If a hip roof is used on this type of house, there will be a low space to be cut off all four sides of the second floor, and all the windows upstairs will have to be dormers. Naturally, such a roof involves greater expense, and it yields less usable space on the second floor. Compare the second floor space in the two plans of Fig. 82. Their first floors, indicated by a dotted line, are the same size.

Plan a story-and-a-half house, using an irregular shape and any stairway you like. Use a rectangle about 25 by 30 feet for the main

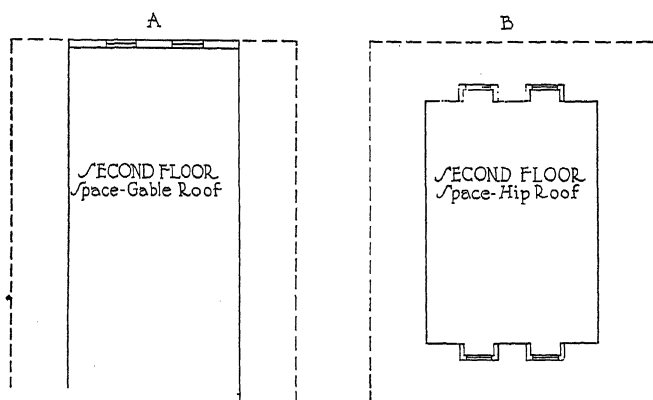


FIG. 82.-A comparison of second-floor space, using two types of roof.

mass, with one wing in any position and any size that you wish. Plan the house for a definite family, either your own or some friend's; or use one of the family groups suggested below:

1. Parents and two children, a girl and a boy.
2. Parents, two children, and a grandmother. (As many old people find it difficult to climb stairs, a bedroom and a bathroom should be included in the first floor plan.)
3. Parents and a grown daughter who gives music lessons. (A music room with a separate entrance would be desirable. If the music room is placed next to the living room, with double doors between, the two rooms could be thrown together for recitals.)

PLANNING THE LITTLE HOUSE

SUGGESTIONS FOR STUDY

1. Draw the exterior of the house you have planned, in a style suitable to your locality.
2. Make a study of recent use of the old English style in your community (see Chap. 16). Note the use of half-timber work, imitation thatching, and window arrangement.
3. Study the relation between broken roof lines in these houses and the shape of the plan. Select a house in which the shape of the roof is poorly related to the plan, and draw new elevations to show more logical roof design.
4. Visit a new house in process of construction, studying the methods used in building, firestopping, insulation, etc. (see Chap. 20).

Special Problems

1 • PLANNING FOR A NARROW LOT

WHILE everyone prefers a roomy building site, it is sometimes necessary to put up a house on a narrow lot. Where land is expensive, the average homeowner cannot afford to tie up several thousand dollars extra in a wide lot. The average city lot varies from about 30 to 60 feet in width. Occasionally, a narrow lot is found in a very desirable neighborhood. In such a case, it would be better to plan a narrow house to fit the lot than to build on a larger lot in an inferior location.

When a house cannot be more than about 20 feet wide, the plan must be placed endwise to the street. If the main entrance is on the street side, either space must be given to a long hall leading to the back of the house, or the room at the front must serve as a passageway. A better use of the space within the house may be obtained if the doorway is placed on the side of the house, almost halfway back. A small entrance hall there will be close to all the rooms on the first floor.

The exterior design of the house should be worked out so that the street end has a pleasing appearance. If the house is two stories high, it is likely to be too tall for its width. As in the square house, every device possible should be used to make it appear lower. Founda-

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tion and ceiling heights should be as low as possible. The roof may be dropped a few feet. The retreating lines of a hip roof afford a softer outline than the uncompromising angle of a gable. A story-and-a-half or one-story wing extending toward the front produces a similar effect by coming between the sharp contrast of vertical wall and horizontal ground.

The styles most adaptable to the narrow house are the informal ones where the lines of the roof may be broken, such as the Mediterranean and the Early English. Also suitable to the narrow façade is the flattened roof of the Regency house. The modern style also offers many interesting possibilities in the designing of a narrow house.

On a narrow lot, it is not possible to build a stately Georgian house with a formal doorway facing the street. Occasionally, one sees such a house turned endwise to fit a narrow lot, but that seems to be disrespectful treatment for a dignified style. Besides, it is extravagant to place a costly classical doorway where it can scarcely be seen.

Plan a two-story or a story-and-a-half house with five to seven rooms. The greatest width of the house should not exceed 24 feet. Make the plan to suit your own family or some family of your acquaintance. If you wish to use all of the limited back-yard space for a garden, place the garage and the kitchen on the front and the living room at the back. An arrangement of this sort is especially desirable in a house that faces north.

The middle section of the plan is the least desirable part, for it may be darkened by neighboring houses or trees. The hall, the stairway, closets, and less important rooms should be grouped in the central area, leaving front and back for the rooms that need more light.

The exterior may be in any style you choose. Study pictures of narrow houses, and copy any details of doorways and windows. If the garage is on the front, pay special attention to the design of its doors.

2 • BUILDING ON A SLOPE

Many interesting plans may be worked out to take advantage of a natural slope in the building site. Figure 83 shows the simplest of

these, with the basement partly above the ground on one side. The space marked A may be used for the stairway, the heating plan, and the laundry. The space marked B may serve for some of the rooms

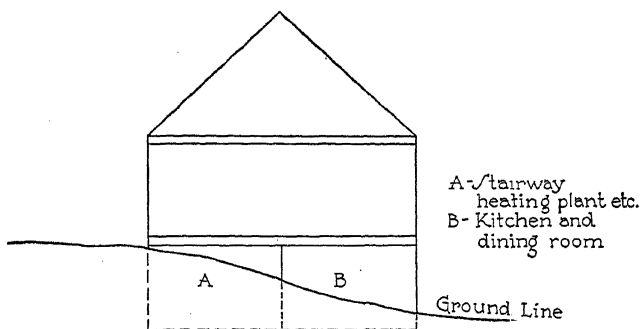


FIG. 83.—A house built on a slope.

ordinarily found on the first floor. The dining room and the kitchen, for instance, may be brought down to the basement level, releasing space on the first floor for a study or an extra bedroom.

Figure 84 shows a variation of the same arrangement, suitable for a gentle slope. The entrance hall, marked C, is really a landing on the

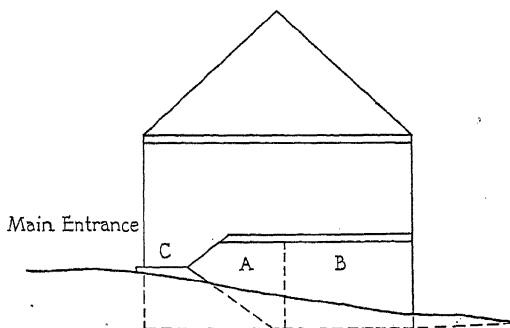


FIG. 84.—Main entrance on a landing.

stairway, at the level of the ground. From it a short flight leads up to the bedroom floor, and a longer flight leads down to the other rooms. Here, again, the space marked A serves for furnace room, laundry, and storage.

PLANNING THE LITTLE HOUSE

If the garage is attached to the house, it should be placed at some point near the street or road. Figure 85 shows an arrangement of house and garage where the approach is from higher ground. If the street is

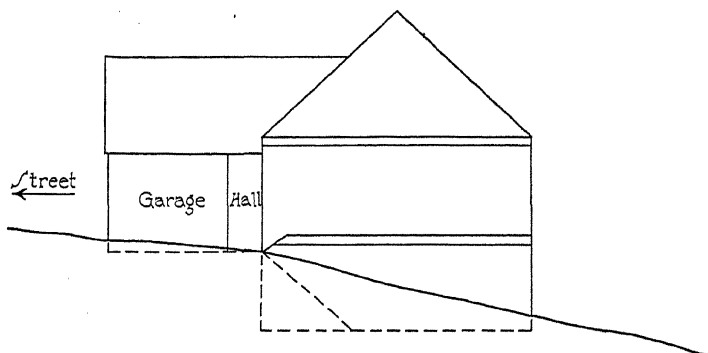


FIG. 85.—A house on a slope, approached from higher ground.

lower than the house, the arrangement of Fig. 86 may be used. In this plan the garage floor is about halfway between the basement and first floor. The space above the garage will then be on the level of a landing about halfway between the first and second floors. Since it is somewhat

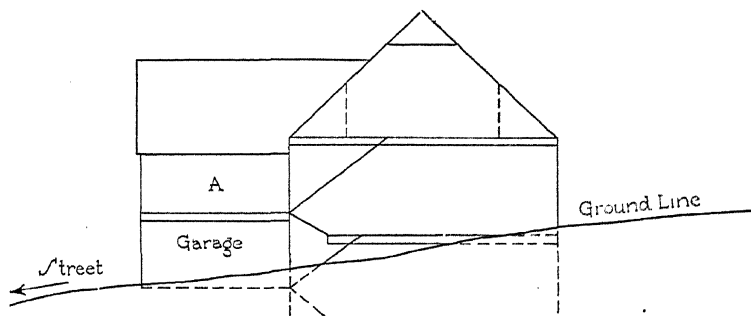


FIG. 86.—A house approached from lower ground.

apart from the rest of the house, it offers the seclusion desirable in a study or a library.

Make a plan for a lot with a gentle slope. An actual lot may be used if accurate data on the contour of the land can be obtained from a

survey. A sectional view of the house, including the stairway, should be referred to constantly while the plan is being drawn.

Working out an exterior design that looks well on a slope is even more difficult than drawing the plan. The house should appear to belong to the ground. An irregular shape that allows the roof lines to follow the slope of the hill is better than a square boxlike structure.

Since a great deal of the foundation wall is exposed, it should be as pleasant to look at as the upper walls. A frame house perched up on a concrete or hollow-tile foundation wall looks alien to the site. If it is possible, the same material should be used for both the foundation and the upper walls. At any rate, they should not present a sharp contrast of texture and color.

3 • PLANNING A FARMHOUSE

If you are familiar with the local needs of a farmhouse, plan one for your family, to suit the climate and other conditions. The planning of farmhouses need not be dealt with as if farmers were a race apart, differing in all their habits from householders in town. There is really no sharp line of difference. The requirements and way of living of farmers are very much like those of town people of similar social and economic conditions. They must have rooms for sleeping, for preparing and eating meals, and for recreation; their children need both indoor and outdoor spaces for play. In general, shelter on a farm serves the same purpose as shelter in town: to provide a convenient and pleasant setting for family life.

The chief points of difference between town and country dwellings spring from the fact that more work is done in direct connection with the farmhouse. The income-producing work of the farm is intimately tied to the house; in the city the breadwinner of the family usually does his work at factory, store, or office—in a place completely separated from his home.

The close connection between farm and house results in a heavy burden for the homemaker. Larger quantities of food must be prepared, laundry work is heavier, and more cleaning up must be done,

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than in the city home. A surplus of fruits and vegetables calls for extensive canning in summer. The distance from grocery stores, restaurants, commercial laundries, and other urban aids to housekeeping forces the farm woman to depend on her own efforts to a much greater degree than does the city woman. Nothing much can be done to decrease the amount of work a farm homemaker must do, but generous and conveniently arranged equipment for cooking, cleaning, and laundry work will at least keep her from wasting energy in doing her tasks.

The special planning required for a farmhouse centers about the service portion, that is, the rear entry, the kitchen, and the laundry. Since the approach to the house is chiefly by motorcar, the planning of the house should really begin with a plan for the entire group of farm buildings and their relation to the driveway. The service entry must, of course, be convenient to both the drive and the barns. If it is emphasized too much, however, and the front door is not conveniently reached from the drive, the latter will be overlooked, and the service entry will be used by all comers. It is often disconcerting to find callers or party guests coming in through the service entrance. It is desirable, then, to place both the front door and the service door close to the driveway, and to provide visitors easy access to the front door.

In the country, rainy weather means muddy boots and wet coats. A coat closet opening into the service entry provides a place for shedding outer garments and prevents the tracking of mud into the house. The service entry should lead into the main part of the house, as well as into the kitchen. A lavatory or bathroom close to the entry makes it easy for farm workers to clean up before meals. The hard physical work required on a farm in warm weather calls for convenient bathing facilities. A shower in the basement is a desirable supplement to the bathroom. If the installation of the bathroom must be left to the future, space should be allowed for it on the plan, even if it is temporarily used for other purposes. In that case, a place for washing up should be provided outside the kitchen.

SPECIAL PROBLEMS

The country house has many advantages over the town house. There are no close neighbors to shut off the view and destroy privacy. The house may be set diagonally with the compass, thus allowing two sides the benefits of the best breeze, the sunshine, and the view. Full advantage may be taken of sloping ground in the country. In the city, the nearness of the street or of neighbors sometimes presents serious obstacles to the best use of the slope.

The amount of space allotted to the various rooms of the farmhouse depends, just as in the city, on the budget and on personal preferences. Where space is limited, less important features must be sacrificed for those which are most desired. A large living room may be obtained by eliminating the dining room and using a corner of the kitchen for family meals, while one end of the living room is used for company meals. If the children must have a quiet place to study, a smaller living room for parents and visitors and a separate dining room (converted after supper into a study) may be the best solution of the family's needs. If the bedrooms are used only for sleeping and dressing, they may be made very small, and the space thus saved may be given to a utility room, or to a small office to be used for business talks and farm accounts.

The need for extra help on the farm often presents a difficult problem. In some sections of the country, it is the custom to provide sleeping quarters for the hired hands apart from the house. In others, the hired man expects to be treated like a member of the family, to eat with them, to share their recreation space, and to sleep in the house. The constant presence in the family circle of an outsider is undesirable in many ways. If the plan is so arranged that the hired man may go to his room without passing through the main body of the house, some degree of privacy for the family may be achieved.

In general, the farm kitchen should be arranged like any other well-planned kitchen, with the main work centers grouped together, and additional features, such as the dining center, play space for children, or a desk, placed apart, where they will not be in the way of routine work. The size of the kitchen depends on the number of

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people that must be fed regularly, as well as on the number of uses to which the room is put. If the kitchen is used only for preparing meals, it can be quite small, even though it must have more extensive work counters and larger storage spaces than the city kitchen. If, however, such activities as canning, laundry work, the scalding of milk pails, dining, and children's play are added to the kitchen, it must be enlarged to make room for them. In many farmhouses the varied jobs mentioned above are divided between the kitchen and an adjoining utility room, which also opens into the service entry.

The utility room relieves the kitchen of the need for being awkwardly large and prevents the confusion attendant on trying to do several things at once with one set of equipment. A second cooking center in the utility room, for instance, may serve for large-quantity canning, while the preparation of meals goes on undisturbed in the kitchen. If a first-floor utility room is fitted up for laundry work, it will save the heaviest part of modern washing, the carrying of wet clothes up from the basement. The room may also be used for storage of cooking fuel, of kitchen utensils that are seldom used, and of canned goods.

Since the farm homemaker's work centers about the kitchen, her additional tasks, such as caring for children, mending, washing and ironing, and canning should be planned in relation to the kitchen. A corner of the kitchen or of an adjoining room may be set aside for the children's play space. Sewing, whether it be just mending or more ambitious dressmaking, is usually an intermittent task, to be taken up whenever a bit of spare time appears. Teen-age daughters may find an upstairs sewing room extremely useful, but for the homemaker herself a sewing center nearer the kitchen would be better. If a chest of drawers or a few shelves in a closet can be provided, the week's mending need not be stacked on the sideboard or the living-room table.

If a basement is used, it should be planned as carefully as the upper floors. The heating plant; storage spaces for fuel, vegetables, and canned goods; racks for screens and storm windows; and a workbench may be located in the basement. If the budget will not permit

the inclusion of the utility room in the first-floor plan, it must be placed in the basement, although that means extra steps for the housewife. Miss Wilson¹ suggests that the land be graded so that entrance to the basement from ground level will be available on one side of the house, making it possible to carry in heavy loads on wheelbarrows. If so steep a grade is not obtainable, a short ramp may be used in place of steps.

Many details of farmhouse planning depend on the local climate. A spread-out, rambling plan with ample window space may be suitable for the South, while a compact square plan, with small windows, is better for the Northern states. The long gallery type of porch is obviously designed to shield the house from too hot a sun. In the Northern states the addition of a porch for a few months' use in summer must be arranged so that it will not shut out sunshine during the long winter. In windy, cold sections, vestibules should be provided for all outside doors.

SUGGESTIONS FOR STUDY

1. Study the houses in your community that have been built on sloping land. Judge them for design in relation to site, ease of approach to the garage, and use of the best exposure.
2. List the special needs of farm families in your locality. List the ways in which the requirements of the climate, farm work done in connection with the house, and accommodations for hired help, may be met in the plan.
3. Study several houses in your city that have been built on narrow lots, noting the use of exterior design, the relation between indoor and outdoor living space, and the location of the garage.
4. Make a study of comparative local costs of finishing materials for exterior and interior walls, floors, and woodwork (see Chap. 21).

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Buying and Remodeling a House

IN CERTAIN cases, it may be advisable to buy a house ready built. In the suburbs of large cities, it is common practice for development companies to buy a tract of land, lay out streets, install utilities and construct a large number of houses for sale. These large-scale building operations make for economy of labor and materials and often they offer a better house for the money than one could obtain by individual building.

One objection to "development" houses is that their plans and exterior designs are made to appeal to the mass of people. Individual taste or special needs in planning cannot be catered to. One standard plan may be used for fifty houses, with dressy little touches on the outside to give an illusion of variety. One of the most deadly sights in the world is a street of a low-type development, with its rows of identical houses. In late years, however, the larger construction companies have employed architects to design their houses, with consequent improvement in design. In some developments, early purchasers are offered a choice of half a dozen stock plans and exteriors. Figure 76 shows a "development" house of simple and inoffensive design.

The chief danger in buying a speculative house is that its construction may be skimped. Faults in building are not easily detected

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in a new house, but they take their toll, in a few years, in high repair bills and unduly rapid depreciation. The reputation of the construction company is of the greatest importance in buying a ready-built house. A well-established company is not likely to endanger its prestige by selling jerry-built houses.

Since, usually, the layman is not able to judge the construction of a finished house, it is wise, before buying, to employ a competent



FIG. 87A.—Before remodeling. Wide overhang of roof, ponderous brackets, and a distracting pattern of dark and light are the chief faults of this house. (*Photograph by Mott.*)

and disinterested architect or contractor to look it over. A thorough study of the plan should also be made. If the blueprints are not available, the buyer would do well to measure the rooms and make his own plans. Suggestions for studying plans are given in Chap. 3.

The remodeling of an old house is justified if its structure is sound and its location is desirable. Few general rules may be laid down for remodeling, for each house has its own individual problems. Before

BUYING AND REMODELING A HOUSE

embarking on plans for making changes, the owner should make a study of the construction of his house. He should know which way the joists are laid, which partitions are best left in, and which may be removed without too great expense. Extensive remodeling of an old house may be more costly, and less satisfactory, than building a new one.



FIG. 87B.—After remodeling. A pleasant dignified design has been achieved without altering the essential structure of the house. (*Howard G. Elwell, architect; photograph by Mott.*)

The objective in remodeling is usually twofold: to improve the exterior design, and to provide a more convenient and beautiful interior. Sometimes, however, as in colonial houses, the exterior is so satisfactory that modernizing the plan must be done without changing the outside. With houses of a later vintage, however, the problem often includes shearing off Victorian excrescences, improving the design and placing of windows, and simplifying the roof lines. Not all Victorian houses are ugly, however. Many of them possess qualities

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of dignity and repose. It is better to leave such houses with as much of their original character as possible. Attempts to graft colonial or English or Spanish exteriors on them are likely to end in strange-looking results.

Many old houses fail to measure up to modern standards as to bathroom and storage space. Sometimes, a small, poorly lighted bed-



FIG. 88A.—Before alterations. Inoffensive, but decidedly old-fashioned. The main mass appears too tall. (*Courtesy of Johns-Manville Corporation.*)

room may be subdivided into two bathrooms, or into a bath and several closets. The old-fashioned kitchen, with its enormous floor space and widely scattered equipment, may be reduced in size and made more efficient by modern arrangement. Generally speaking, changes in the plan should be made with as little tearing down of the old structure as possible. If, for instance, the old “parlor” is too small, and an extra room is needed for study or guest room, it would be better to build on a new, large living room, and use the parlor for a study.

BUYING AND REMODELING A HOUSE

A thorough study of the surroundings should be made before a house is remodeled. It may be desirable to reorient the house, in order to provide greater privacy or more winter sunshine or to bring the house and the garden into a closer relationship. If the kitchen and the pantry command the best view, they may be made into the new living room. Changing neighborhood conditions, such as increased street



FIG. 88B.—After alterations. A more harmonious design produced by simplifying the roof and building up the wings at the sides. The tall portico is useful in warm climates where shade is needed for the windows. (Courtesy of Johns-Manville Corporation.)

traffic or a new building next door, may have made the old living room into the least desirable part of the house. Moving such things as stairways and plumbing fixtures is relatively expensive, but may be justified if it produces a quieter and better ventilated position for the bedrooms.

In certain cases, it is better to endure an unsymmetrical or badly proportioned room than to sink a large sum of money in an old house. Ill-shaped rooms are characteristic of houses of the nineties. Changing

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their shape often costs too much in proportion to the value of the house. In such cases, redecorating may be substituted for remodeling. Light-colored paint over dark woodwork will disguise the poor placing of doors and windows, and a cheerful and unusual color scheme will distract attention from the ungraceful shape of the room.

In Figs. 90, 91, and 92, are shown the plans of three farmhouses that have been remodeled. In the first one, the oversize kitchen yielded

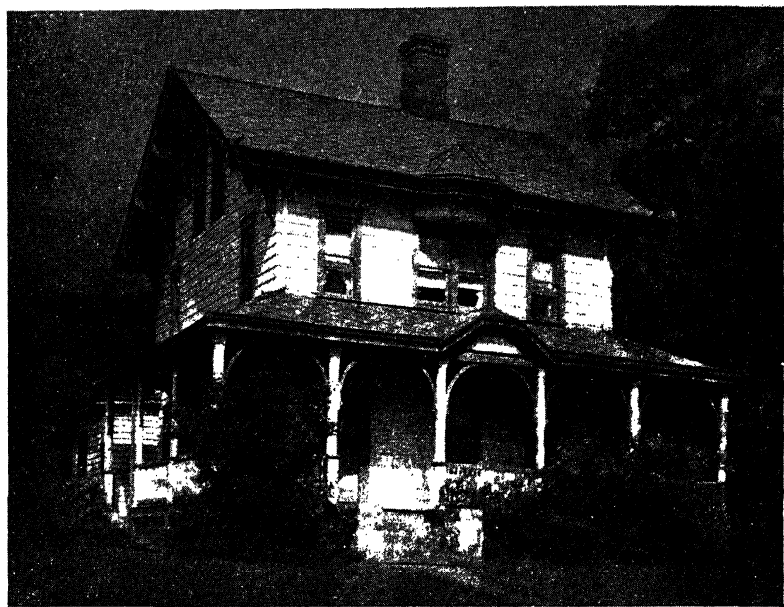


FIG. 89A.—Before alterations. A heavy, badly proportioned porch darkens all the downstairs rooms. (Courtesy of Johns-Manville Corporation.)

space for two roomy closets. The beam across the living room ceiling is a substitute for the partition that formerly divided the space into two small rooms. Reversing the direction of the stairway made it possible to convert the second-floor hall into two badly needed closets. The inconvenience of having the foot of the stairway near the fireplace is in this case offset by the gain in closet room above. The attic space over the kitchen was large enough for the bathroom.

BUYING AND REMODELING A HOUSE

In Fig. 91, the old kitchen, pantry, and entry were thrown together and redivided into a small compact kitchen and a dining room. The old dining room provided space for the bedroom and bath that were needed on the first floor. The stairway was moved back several feet to allow space for a little square hall, joining living room, bath, kitchen, and stair. The second floor was not changed.



FIG. 89B.—After alterations. Improvement has been made by removal of the front porch. The square porch at the side is more secluded and more useful than a long narrow front porch. A neater, simpler roof improves the appearance of the house. (Courtesy of Johns-Manville Corporation.)

In the third plan, a larger farmhouse has been remodeled for the use of elderly people whose children have left home. The huge kitchen, pantry, and utility room are combined to make a large, pleasant living room. Removal of the south porch allows the winter sunshine to enter. The bedroom and bath have been placed on the first floor, so that the old people need not climb stairs. The rooms on the second floor serve as guest rooms, and have not been changed.

PLANNING THE LITTLE HOUSE

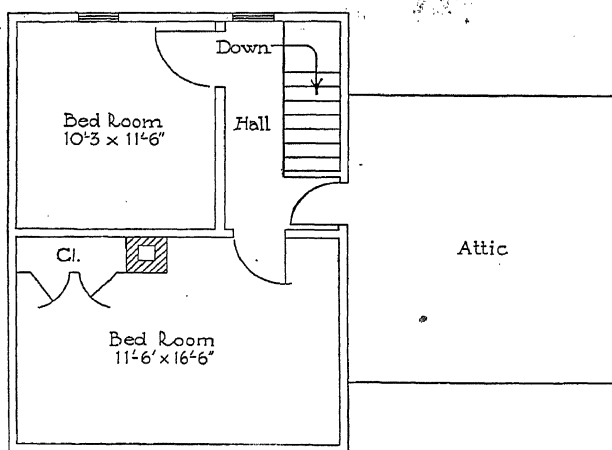
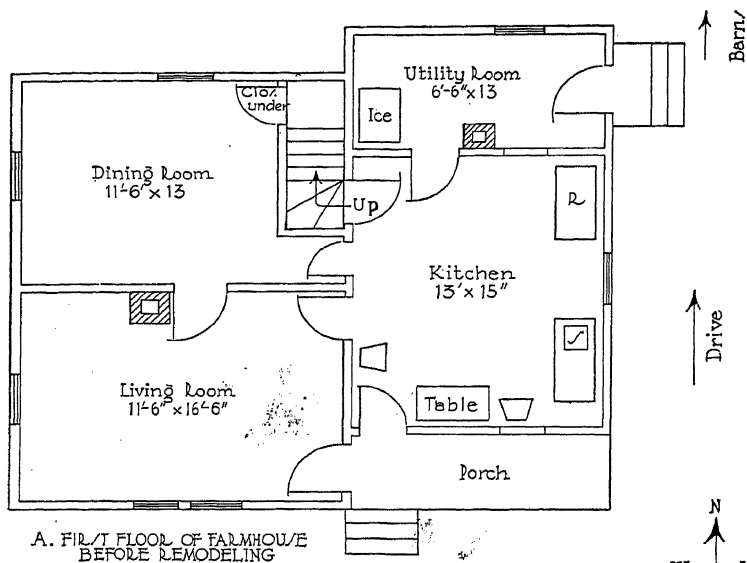


FIG. 90A and B.—An old-fashioned farmhouse plan.

BUYING AND REMODELING A HOUSE

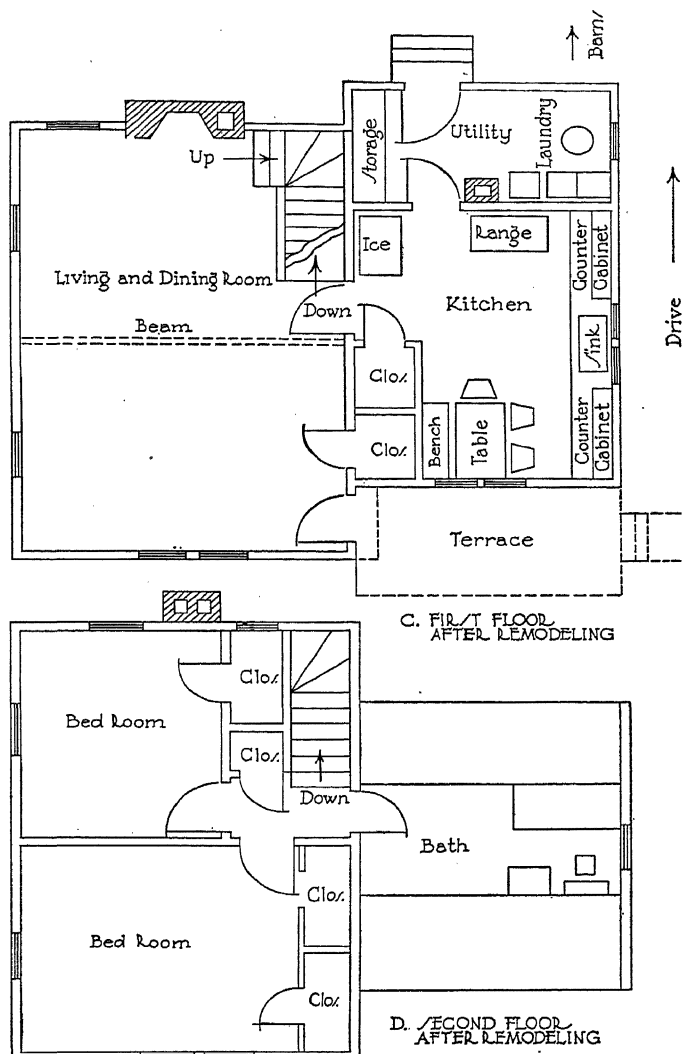
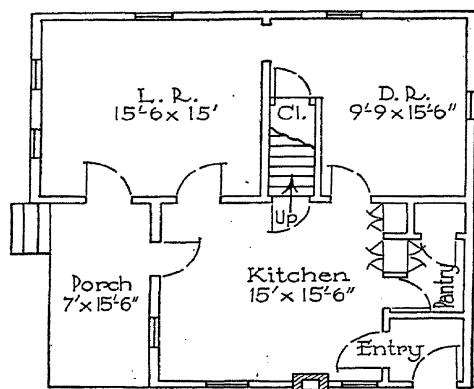


FIG. 90C and D.—The plan after remodeling. Needed closet space and a more efficient kitchen have been provided. Substitution of a terrace for the porch brings winter sunshine into the kitchen.

PLANNING THE LITTLE HOUSE



FARMHOUSE BEFORE

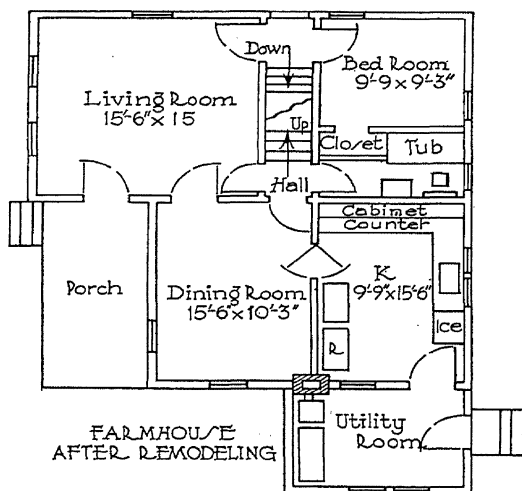


FIG. 91.—A remodeled first floor.

BUYING AND REMODELING A HOUSE

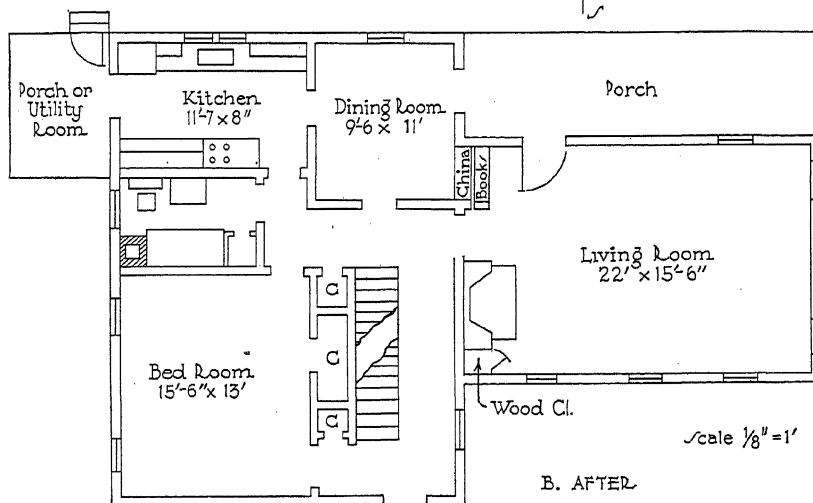
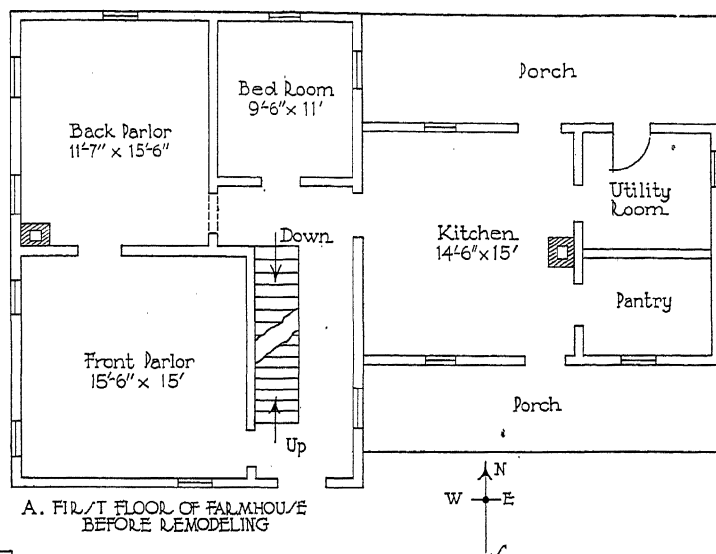


FIG. 92.—A remodeled first floor.

PLANNING THE LITTLE HOUSE

If you wish to plan the remodeling of an old house, the first thing to do is to obtain an accurate plan, together with all the information possible concerning the structure, that is, the direction of joists, the partitions that bear a load, and so on. Then make two lists, one showing the faults of the old plan, and the other the improvements desired. Tentative plans for remodeling may be made very easily by laying a piece of tracing paper over the original plan, and sketching in new arrangements of space.

SUGGESTIONS FOR STUDY

1. If you have access to old magazines of the nineteenth century, such as the *American Architect*, *Godey's Ladies' Book*, and others, in which house plans are shown, make a study of the arrangement of houses of a generation or two ago. Even plans of 20 years ago show features that are no longer useful for modern living.
2. Select a plan from an old book or magazine, copy it to scale, and work out tentative plans for remodeling it.
3. Select an exterior view of an old house from a book or magazine, or use an actual house in the community, and list the features that make it old-fashioned or bad in design. Draw new elevations for it, to improve and modernize it.
4. Study plans and exteriors appearing in current magazines, and list features that are likely to be out of date and undesirable 10 years hence.

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Constructing a Scale Model

FOR showing the appearance of the finished house, a three-dimensional model is better than elevations or even perspective sketches. Such a model is not difficult to make. Cardboard, gummed-paper tape, colored pencils, and a few sheets of colored paper are the only materials needed.

If the plan of the house is a plain rectangle in shape, the construction of the model is simply a matter of cutting the four walls and the roof out of cardboard and fastening them together. The cardboard base is then covered with paper on which the doors and windows have been drawn. Let us suppose that you wish to make a model of the house shown in Fig. 93. Draw the four sides of the house in outline, in $\frac{1}{4}$ -inch scale on cardboard and arrange them in a row, alternating the end and side views, as in Fig. 94. The two sides of the roof may be drawn in one piece with the front and the back walls. They must be high enough to fit against the sloping edge of the gable. If the cardboard is large enough, these pieces may be drawn in a row along the edge, and the lines between them scored. (Scoring means cutting halfway through the cardboard so that it may be bent in a straight line.) Fasten all edges together with pieces of gummed paper. If the paper is cut into strips of the proper length and folded lengthwise before moistening, the work of pasting will be simplified. The scored edges also should

PLANNING THE LITTLE HOUSE

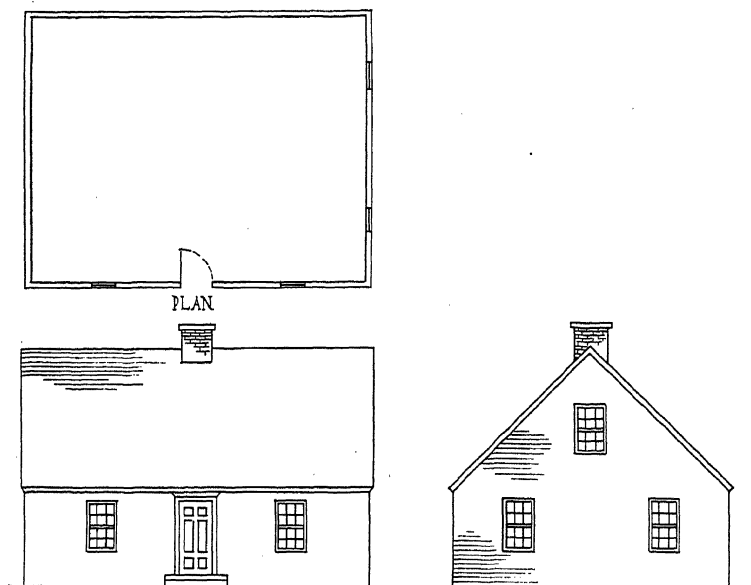
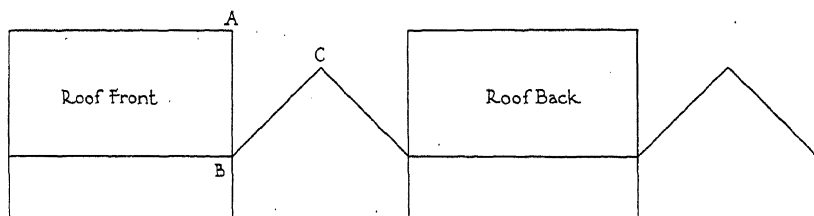
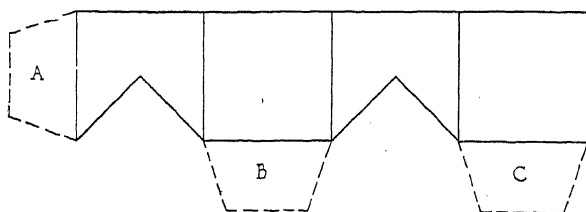


FIG. 93.—Plan and elevations for a model.



AB = BC
FIG. 94.—Pattern for walls and roof.



A, B, C—Flaps for putting
FIG. 95.—Chimney pattern.

CONSTRUCTING A SCALE MODEL

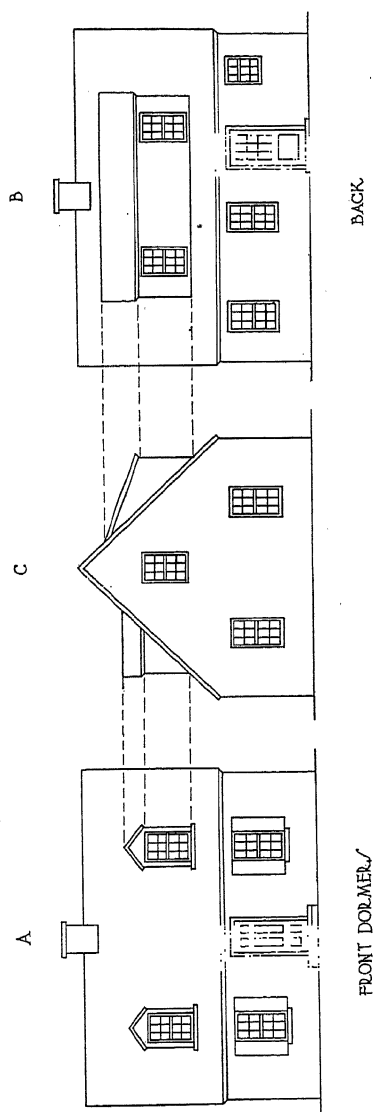


FIG. 96.—A house with two kinds of dormer.

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be strengthened with strips of the tape. A pattern for the chimney is shown in Fig. 95. It may be made of heavy paper and pasted to the roof by the flaps A and B.

The cardboard foundation may then be covered with paper on which the doors and windows have been drawn with colored pencils. To take care of any irregularities in the shape of the cardboard structure, make a pattern for the cover by laying the model on paper and drawing around each side. The color of the paper used to cover the wall depends upon the material to be represented. Horizontal lines may be drawn on white or gray paper to represent siding. For a brick

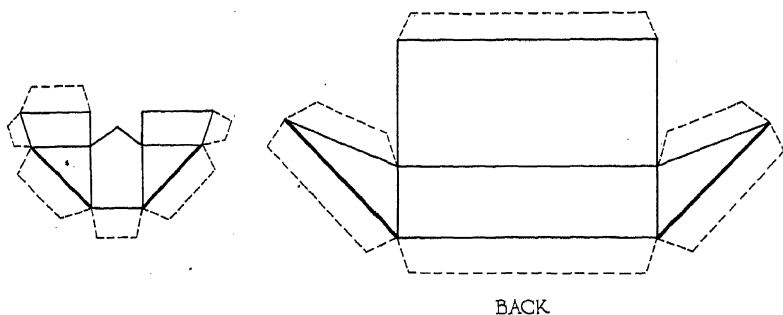


FIG. 97.—Patterns for dormers.

wall, draw a few mortar lines here and there with a white pencil on dull red paper. Green, gray, or brown paper for the roof covering may be softened in color by strokes of colored pencils. Corrugated cardboard painted a dull red with poster paint serves very well for a Spanish tile roof. The roof cover, of course, must be cut to fit around the chimney. Be careful that the roof does not project too far beyond the walls.

If you wish to add dormers to this house, cut them out of heavy paper and paste them to the roof as you did the chimney. Figure 96 shows elevations of the front, side, and back of the house, with single gable dormers on the front and a large shed dormer on the back. Patterns for these dormers are shown in Fig. 97. Flaps for pasting are drawn with a dotted line. When dormers are used, the roof covering must be cut to fit around them, also.

CONSTRUCTING A SCALE MODEL

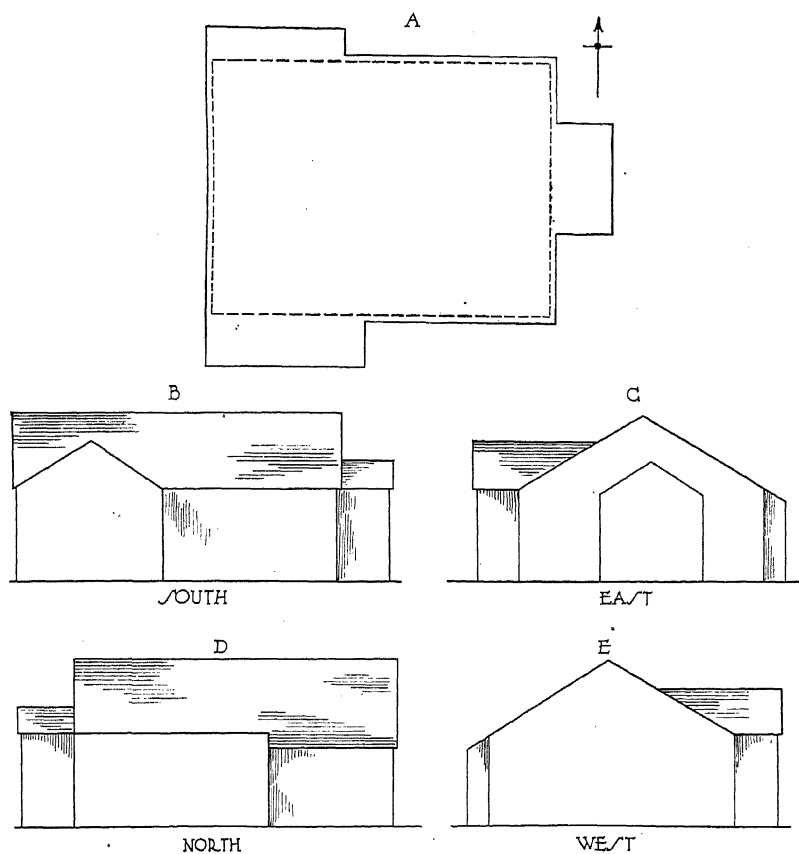


FIG. 98.—A plan of irregular shape.

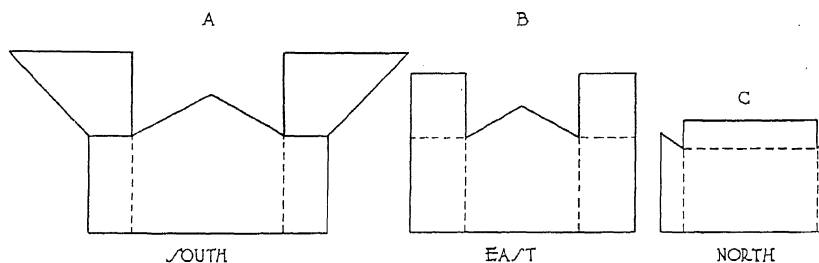


FIG. 99.—Patterns for projections.

PLANNING THE LITTLE HOUSE

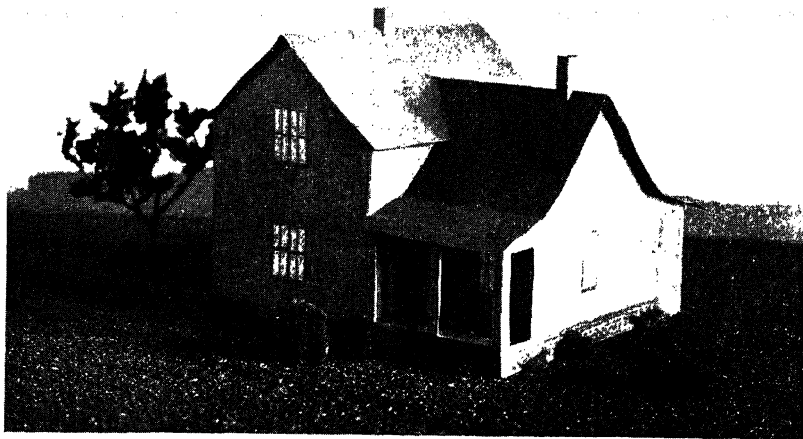


FIG. 100A.—A model of a farm-house, before alterations.

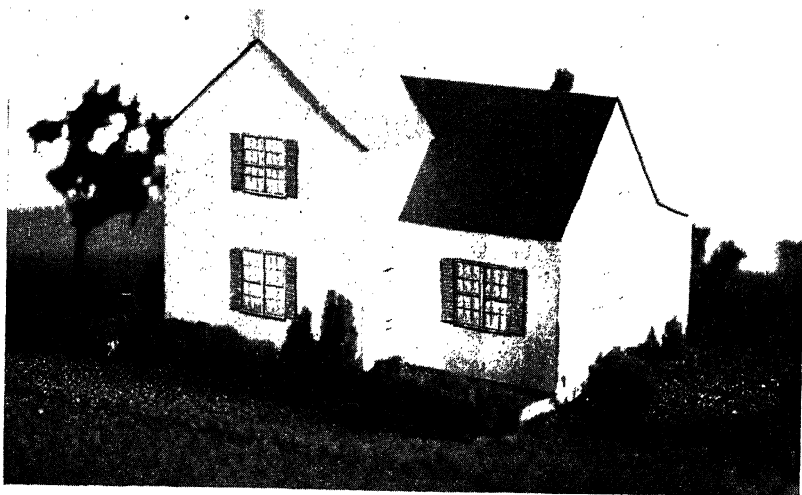


FIG. 100B.—Proposed alterations were tried out on a cardboard model before actual work started.

CONSTRUCTING A SCALE MODEL

When the plan is irregular in shape, as in Fig. 98, the best way to construct a sturdy and durable model is to make the parts separately and then fasten them together. The main mass of the house, as shown by the dotted line, should be made first, according to the directions given for the first model. Patterns for the three projections are shown in Fig. 99. Only three sides of each projection need be made, for the main mass of the house provides the fourth side. It is wise to make paper patterns of these parts first, and "try them on," before cutting them out of the cardboard. After the cardboard sections have been fastened together, the model may be covered as described above. Figures 100A and B show "before" and "after" models of the farmhouse plans of Fig. 90.

Old World Houses

1 • THE EARLY ENGLISH HOUSE

THE cottages of medieval England have had an important influence on the design of American houses during the last twenty-odd years. Both the half-timber types and the Cotswold stone houses have been copied and adopted in every imaginable variation, with both happy and unfortunate effects. The best results, naturally, have been obtained when owner and architect together have arrived at a sympathetic understanding of old English houses, through a study of the material available in books and magazines. Such material is to be found in abundance. A famous old English house is shown in Fig. 101.

In general shape the old English cottage is rather low and rambling, with broken roof lines and informally balanced arrangement of doors and windows. An irregular shape is to be expected in a house that has been lived in for generations, for, as more space was needed, wings and gables were added to the original structure.

The most conspicuous feature of the half-timber cottage is the pattern produced by the construction of the walls. This consists of a massive framework of solid timbers, both vertical and horizontal, often combined with diagonal or curved braces. The spaces between

OLD WORLD HOUSES

the timbers were filled in solid, usually with brick, covered over on inner and outer surfaces with plaster. (Originally clay daubed on woven willow twigs—called wattle-and-daub—was used.) The solid walls of half-timber construction are quite different from modern framing, with its hollow walls made of 2-by-4 studding covered by thin layers inside and out.

In those parts of England where stone was plentiful, houses were built entirely of that material. The famous Cotswold district contains



FIG. 101.—Shakespeare's birthplace. The steep roof, small-paned casement windows, and heavy timbers forming the framework of the walls are characteristic of the early English house. (Courtesy of Walter Scott, Bradford, England.)

many beautiful stone houses. Some old houses are part stone and part half-timber, with perhaps a newer wing of brick built onto the older part.

Gable roofs, steeply pitched, were characteristic, although the hip roof also was used. The early roofing material was thatch (bundles of straw), fastened to the roof framing. The inflammable nature of thatch resulted in its being replaced, in towns, at least, by slate and tile. The edge of the roof, whatever its material, was very simply

PLANNING THE LITTLE HOUSE

treated. Slate and tile roofs had little overhang. There was no classic cornice, such as is found in Renaissance houses. The gable was sometimes finished with a flat strip of wood, called a bargeboard.

The doorway was comparatively unimportant. A plain door of planks or paneling was set in a simple frame of timbers. A square-topped door is most characteristic, although the Tudor arch (a flat, pointed arch) was used. Since this style dates from before the classic revival, columns, pilasters and pediments were not used on doorways. Rather small casement windows were used. Their arrangement was a direct expression of the inner plan of the house, rather than an attempt at a formal outer design. They were placed singly or in pairs, or in groups of three or more, according to the size and importance of the room they lighted. Very small windowpanes, either rectangular or diamond-shaped, were used. Chimneys were large and numerous, for all heating, as well as cooking, was done by means of fireplaces, and each fireplace had to have its own flue. It was natural that the chimney, as an outward sign of the heating system, should be a prominent part of the design.

Applied decoration consisted mainly of carving on bargeboard, door-frame, and other timbers. Designs were sometimes molded in the plaster covering of the wall. Wrought-iron hinges, nailheads, and latches decorated the doorway. The main decoration of the house, however, was inherent in the materials used: the pattern of dark and light produced by half-timber work and the varied surfaces and tones of stone, slate, and handmade brick. Richly textured materials such as these need no applied decoration.

The old English cottage has in the past few years been used as a model for countless American houses. It is rather strange that this age of machinery and mass production should try to reproduce a style that was entirely a product of laborious handwork and primitive methods of construction. As a matter of fact, often only the outward appearance of the original is reproduced. Inexpensive houses are built of brick veneer or stucco on a frame of 2-by-4 studding, a method of construction not used at all in medieval England. Genuine half-timber

construction is far too costly for the average house. It is often imitated by means of thin strips of wood nailed into a stucco wall surface. Nobody, however, is fooled by false half-timber work. To those who abhor imitations of any sort it is not acceptable; others justify it on the ground that the strips of wood serve a decorative purpose by breaking up a wall space that would otherwise be too bare. Perhaps it has not occurred to them that a plain wall may be enjoyable for its simplicity and repose.

If imitation half-timber work is used, the following precautions might well be observed. The strips of wood should be used sparingly, where decoration is desirable; they should be placed in positions that suggest structure—that is, at floor levels, and as frames around doors and windows. Wood used for the strips should be neither too obviously machine cut nor too rough. A very slight irregularity of surface and outline is not offensive, but the effect of handwork cannot be attained by hacking a machine-cut board with an ax. The color and finish of the wood should have a natural, weathered look. Bright-brown stain, shiny varnish, and strong value contrasts against the stucco are all to be avoided. Perhaps a better way to break up a bare wall space is to grow a few slender lines of ivy on it.

Genuine thatch is not practical for modern American use, chiefly because of its inflammable nature. It is sometimes imitated by bending the edge of a composition roof into a heavy curve. The result is clumsy and unnatural and does not resemble thatch in the slightest degree. It is far better to treat the roofing, whether it be shingles, slate, or tile, in a simple and direct manner.

The English cottage is loved for its quaintness and picturesque-ness. These intangible qualities are chiefly the result of age. Time has softened the contours and mellowed the surfaces of old houses, while passing generations of tenants have added an interesting variety of roof lines by means of L's and gables. The use of handmade materials also contributes to the charm of old buildings. Hand-hewn timber, handmade bricks, and thick, irregular slate possess fascinating variations of color and texture.

PLANNING THE LITTLE HOUSE

The attempt to gain the charm of age in new houses has caused many builders to go astray from the paths of sincerity and good taste. The irregular roof lines of old houses resulted from additions to the original plans, as more space was needed. Crowding a choppy roof onto a plain square or oblong plan of today accomplishes only illogical and dishonest structure, and adds extra cost.

The quaintness of the old English cottage is partly a result of the steep angle of the roof. Some builders of today seem to believe that making the roof twice as steep makes the house twice as quaint. The sagging roof line of old houses is sometimes imitated by building up the ends of the ridgepole into a sharp point. A sagging ridgepole is a sign of weak structure and does not look attractive, either to a homeowner who must pay for repairing it, or to a carpenter who is proud of doing good work.

Still other sins against the old English cottage have been committed in the use of materials. The subtle variations of color and texture found in handmade materials have been grossly exaggerated by modern manufacturers. As a result, green, purple, and yellow bricks are mingled in the same wall; freckled roofs display a dozen colors; and stucco walls are gouged and smeared into all manner of unpleasant surfaces. Such treatment of materials makes a house look untidy and overdressed, not charming. Irregularity of color and texture should be used with great restraint. It should seem to be a natural result of manufacture, not deliberate forcing, and it should be so subtle and slight as scarcely to be noticed.

Modern ideas on ventilation call for greater window space than many of the old houses possessed. This may be achieved by increasing the number of windows, rather than their size. Steel-framed casements are not exactly like the old wood casements with their leaded glass; but they are in general use because they are cheaper and more satisfactory. Double-hung windows belong to a later period, but they may be used in a free adaptation of the old English style. Diamond-shaped window-panes should be introduced sparingly, as decorative accents; used all over the house, their diagonal lines are tiring to the eye.

The English cottage style can hardly be used if the most rigid economy must be observed. The Cotswold house cannot be copied except where stone is plentiful, and even then, high-priced stone masons must be employed to lay the walls. Genuine half-timber work is prohibitive in price; even the imitation is costly. Perhaps the best way to use the old English style is to adapt it freely, using the steep roof, casement windows, and simple trim with plain stucco walls, and wood or composition shingles for the roof.

2 • THE GEORGIAN HOUSE

During the seventeenth century, English architecture came under the influence of the Italian Renaissance, which in turn was derived from the architecture of ancient Greece and Rome. The Gothic style went out of fashion and was replaced by the classic style, starting with churches and palaces, and finally extending to the small dwellings of the people. Of course, this change took place slowly, especially in the small country house, and half-timber houses of medieval design continued to be built for many years after the introduction of the new style.

In the new buildings, columns, pediments, and cornices, borrowed at second hand from classical sources, were freely used, either as parts of the structure or as ornaments applied to the surface. The Roman arch, also, was used. The outstanding characteristic of the new style was strictly formal balance, both in the arrangement of masses and in the disposition of windows and doors.

Bits of Renaissance ornament, such as columns, capitals, and classic cornices, had been in use in England since the time of Henry VIII, but their nature was imperfectly understood by the English builder and they were usually mixed in an awkward fashion with Gothic forms. The new style was not firmly established in England until the early part of the seventeenth century, when Inigo Jones (1573-1652) brought back from Italy a clear vision of what Renaissance architecture was. His banqueting house, Whitehall, built about 1620, was the first truly classical building in England. After Jones, Sir

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Christopher Wren (1630–1723), the most famous architect England has produced, did much to make the classical style popular.

“The gulf between the Renaissance and Gothic building is deep and fundamental. The Gothic house was mainly the product of simple contemporary requirements; based on a rough preliminary plan, perhaps scratched on stone by the master-mason, the conception was altered, enlarged or modified as the work progressed, its detail being in the hands of largely independent journeymen, who might add their individual touches of gaiety or gloom. The Renaissance house was entirely the product of one man’s mind, and was fully designed, both in plan and elevation, before the work was begun, with the details drawn out ‘in the large.’ The proportions were referred to a strict, almost mathematical formula—from which, with a characteristic perversity, English architecture was often most happy when it sought to escape. The Early Renaissance builders had endeavoured to combine Classical principle with Gothic method, and the results were inevitably surprising.”¹

In the small house the new style called for definite changes in design. First and most important, the old freedom of arrangement that went with the informal design of the medieval house was replaced by strictly formal balance. Sometimes the convenience and comfort of the interior were sacrificed for the absolute symmetry demanded of the exterior design. In the large manor houses the disposition toward formal balance had appeared during Tudor times and was combined with some of the characteristics of the old style, such as steep gables and leaded casements. In time, however, the roof was flattened, double-hung windows with wood muntins replaced the old casements, and classical detail appeared as decoration.

The typical small house of the new style was of a solid, rectangular shape, built of brick. A roof of gable or hip form was finished at the edge with moldings in the style of the classic cornice. The doorway, in the exact center, dominated the façade, with decorations of columns or pilasters surmounted by entablature and pediment. This

¹ DUTTON, RALPH. *The English Country House*. Charles Scribner’s Sons. New York. 1936.

was called the "temple-front" doorway. Large double-hung windows were arranged in formal balance. Often, the decorations of the doorway and the cornice, and sometimes window sills, were of white stone, forming a pleasing pattern of dark and light with the brick walls. Figure 102 shows a small house in the new style, with the Gothic tower of Canterbury Cathedral behind it. Houses of this type

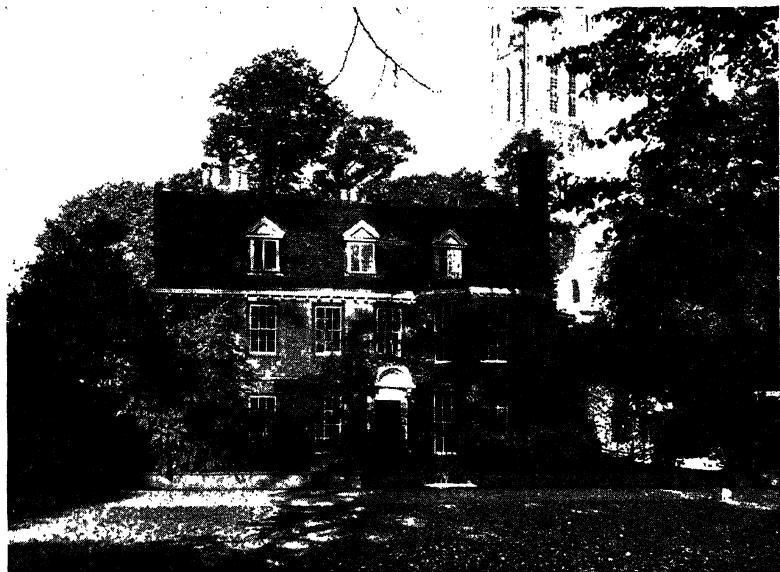


FIG. 102.—An English house of classic design. (Courtesy of Walter Scott, Bradford, England.)

were fashionable during the Georgian period, which was named for the four kings who ruled England through the major part of the eighteenth century. The term "Georgian," therefore, is often used to describe the classic design style. Interest in Greek and Roman sources of design continued on into the early part of the nineteenth century, until the Victorian period ushered in curious and regrettable changes in public taste.

The latter part of the Georgian period is often referred to as the Regency period. Historically, the Regency was the period from 1811 to 1820 when George IV served as regent for his demented

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father. In the matter of architecture and decoration, however, the Regency period is more loosely interpreted and covers a longer period of time. It means, especially, the fresh wave of interest in Grecian affairs and design that swept through Europe (and America) during the early nineteenth century. This period saw the culmination and final flowering of the English Renaissance in the field of architecture



FIG. 103.—A modern use of the Regency style. (*Lucht and Anderson, architects; photograph by Gottscho.*)

and decoration. Designers turned directly to ancient Greece and Rome for their inspiration, instead of using classic design filtered, as it were, through Italian Renaissance usage.

In general feeling, Regency houses were similar to those of the earlier Georgian style; that is, strictly formal balance was used, and ornament, where it was employed, was of classical character. The general tendency through the late Georgian period was toward flatter roofs and larger windows. Often the wall was carried up into a coping that practically hid the flattened gable or hip roof. Details were simpler and larger in scale than the delicate cake-frosting style of

decoration made popular in mid-Georgian years by Robert Adam. Wrought-iron porches and balconies were sometimes used with Regency houses. An interest in Chinese design had persisted in England since the development of trade with the Far East. While this interest had expressed itself chiefly in furniture and interior decoration, a slight Chinese influence may be seen in the pagoda-shaped metal hoods used over doorways and bay windows during the Regency period.

Considerable interest in early nineteenth-century decoration has recently been shown, both abroad and in the United States. The characteristics of the Regency house are adaptable to small, as well as large, houses. The simplicity and dignity of the style make it especially suitable for urban dwellings. Some of the free interpretations of Regency design—an example of which is found in Fig. 103—are described as classic modern. The larger windows, as well as the larger windowpanes, of the Regency house are more in harmony with modern ideas on window design than are those of the earlier styles. Perhaps it is too much to hope that the Regency style will displace the ultrapiquesque Old English and Spanish styles in popular fancy.

3 • OTHER EUROPEAN HOUSES

For many years, the famous châteaux of France served as models for the houses of very wealthy Americans. The show place of many a community is likely to be a steep-roofed mansion with towers and elaborate dormer windows, or a classic stone house of French Renaissance style. Interest in French houses, however, has extended in recent years even to the small farm cottages, and today many very little American houses are displaying a French accent.

The architecture of the various sections of France offers so great a variety that the term "French," applied to houses, is too general to have much meaning. In the north of France, particularly in Normandy, the old houses closely resemble their English neighbors of the same period, while the houses of southern France are similar in appearance to the houses of Spain and Italy. In this country, "French" usually

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means "Norman," for that style has proved most popular as a model for American houses.

The Norman house had many of the characteristics of the medieval English house, such as steep roofs, brick, stone, and half-timber construction of walls, and small casement windows. In certain details however, they differed—in the Norman structure the hip roof was used instead of the gable; and dormer windows, either breaking through the edge of the roof or set high up on its slope, were typically French in design. A distinguishing feature of the larger house was the use of towers—round, square, or octagonal—with sharply pointed roofs. The tower was often used to enclose a winding stairway.

The house in Fig. 61 shows a typical American adaptation of the Norman style. The dormerlike treatment of the second-floor windows and the retreating lines of the hip roof are especially useful in a two-story house of small area, where the height must be decreased. In the one-story house, also, the long graceful sweep of the roof lines holds the house close to the ground, and contributes to a picturesque effect, without a sacrifice of structural integrity.

The use of the Norman tower offers the most serious problem to the builder of a small house. The romantic associations of the tower are so tempting that occasionally one sees dumpy midget towers attached to little one-story cottages—a far cry from the soaring watch-towers of the medieval castle. It takes a large two-story house to carry a tower without looking foolish.

In the semitropical sections of the United States many houses show the influence of Spanish and Italian architecture. The basic characteristic of the original Mediterranean house was the grouping of rooms about a court. Such an arrangement is well adapted to hot countries, especially in crowded cities. An enclosed space open to the sky provides a place where the family may enjoy cool evenings without the sacrifice of privacy. The court of Fig. 104 provides varied forms of outdoor living. Modern building costs limit to large costly houses the use of the fully enclosed court. Smaller houses are often built in an L shape, with a terrace in the angle formed by the

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two wings. Walls or shrubbery on the other two sides of the terrace make it an effective substitute for a court. Outside staircases, loggias, and balconies are also used in mild climates.

American houses of Spanish descent are not usually exact copies of the old. They are more truly adaptations of the original style to modern materials and ways of living. Stucco on framing is used, instead

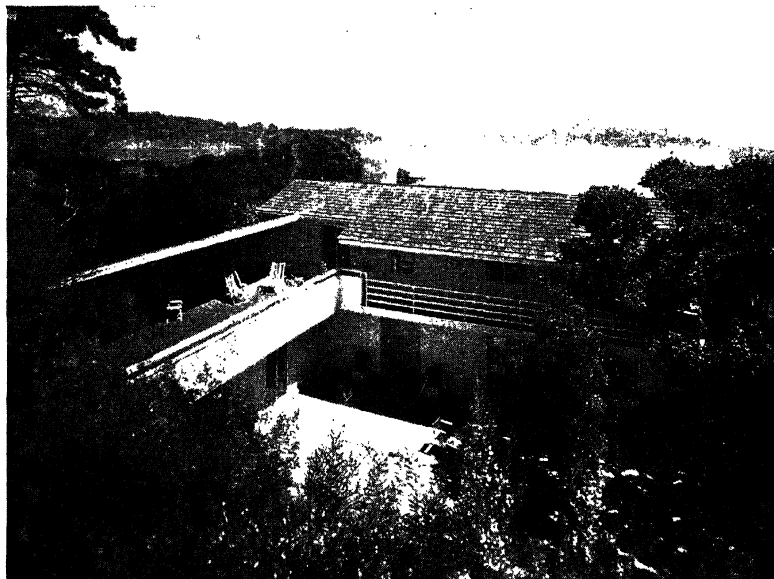


FIG. 104.—The courtyard of a modern California house provides outdoor living in sun and shade. (*Frederick L. R. Confer, architect.*)

of thick stone walls; the arrangement of rooms in the plan and the disposition of windows are not bound by precedent.

Mediterranean houses in America are generally of irregular shape, with varying heights and broken roof lines. Such informality of design is best adapted to the spread-out, rambling arrangement necessary when a court is a part of the house. Flattened gable roofs are usually covered with red tile. In America, double-hung windows sometimes replace the traditional casement: There is considerable irregularity in the size and placing of windows. In the original Spanish house, as

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well as in many American adaptations, windows facing the street are small and few in number, while the windows on the court or garden are large and numerous. Both arched and flat-topped windows are used. The design of the door varies from the simplest type, of vertical planks, to a type with elaborate paneling and carving. Doors are also decorated with wrought-iron hinges and nailheads.



FIG. 105.—A California house. (David J. Witmer and Loyal F. Watson, architects; photograph by Haight.)

Applied decoration consists of colored tile, carving in stone and wood, and wrought iron in the form of hinges, gates, balconies, and grilles. The chief beauty of the Mediterranean house, however, is a matter of sunlight and shadow on white walls against a blue sky. A house may be bare of ornament and still present an effect of rich decoration by means of dark shadows in door and window reveals, and lacy patterns cast by trees. The irregular texture of the tile roof and a slightly uneven surface on stucco walls also have a decorative quality.

OLD WORLD HOUSES

The Spanish frenzy of a decade ago produced many grotesque and overdressed little houses. Extremely rough stucco walls, tile roofs of a half-dozen colors, too many arches, and a profusion of ornament made some houses look like settings for a comic opera. In late years, less feverish interpretations of the Spanish style have grown in popularity. Unobtrusive wall textures and a sparing use of ornament characterize the more recent Mediterranean adaptations. Figure 105 illustrates the simple, dignified style of California house that has supplanted the Spanish craze.

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American Houses

1 • THE PILGRIM HOUSE

THE houses built during the colonial period in America furnish a most interesting field for study. Even a brief acquaintance with the subject impresses one with the great variety of designs produced in the different colonies. The climate, the local resources, and the social background of the settlers all had an influence on the designs of the houses. In the Northern colonies, compact plans, low ceilings, and small windows helped to keep the house warm during the long winters. In the South, high ceilings, two-story porticoes, larger windows, and spacious plans contributed to comfort in hot weather and also furnished a setting for the more liberal social life of the Southern colonists.

Trees were plentiful everywhere, at first; consequently, most of the early houses were built of wood. In Pennsylvania, the abundance of limestone encouraged the building of stone houses; the mental image brought up by the term "Pennsylvania colonial," therefore, is one of a stout, dignified, stone house. In parts of the Southern colonies, heat and dampness shortened the life of wood structures, and led to a general use of brick.

Variations in house design, according to time, are even more pronounced than those produced by geographical factors. For one

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thing, one of the most important style changes in history—that from Gothic to Renaissance—took place in England during the colonial period and before long reached across the ocean to influence American houses. At the same time, conditions of living in the New World underwent a marked change. The colonial period began with the establishment of the settlements in New England and Virginia early in the seventeenth century, and continued until the War for Independence, near the close of the eighteenth. Between those time limits, the wilderness was subdued and an orderly social system was established. The houses built during the early years reflect in their designs the primitive and arduous life of their builders; the late colonial houses reflect the comparative prosperity and worldliness of an established civilization.

Many minor variations may be found in the designs of houses, even in the same colony and during the same period of years. In early days, especially, the building of a house was a strictly local enterprise. What plans there were had to be drawn by the owner or the carpenter, since the services of an architect were not to be had. The lack of transportation forced the use of local materials, and labor was furnished by neighbors and relatives. Thus, it was natural that houses in a given town should conform to a family style, sometimes quite different from the characteristics of houses in the next town. Any attempt to classify and describe colonial types, therefore, must not be considered rigid and complete; it should be looked upon only as a framework into which many individual variations may be fitted.

The colonial period may be divided roughly into two parts, as to time, with the division point about 1700. The first half is usually labeled "Pilgrim," while the second is called "Georgian colonial" to indicate the influence of eighteenth-century English styles upon the later colonial house.

The photographs in Figs. 106 and 107 show typical New England houses of the early colonial period. In the steep roof, small casement windows, and overhang of the upper stories, these houses resemble the medieval houses of England. When the first of the Pilgrims had left

England, near the beginning of the seventeenth century, the influence of the Renaissance was beginning to be reflected in larger buildings, especially in cities, but it had not penetrated to outlying districts or to small houses. The Pilgrims carried with them, therefore, the memory



FIG. 106.—The Capen house, Topsfield, Massachusetts. Built 1683. (Courtesy of Topsfield Historical Society.)

of dwellings of medieval character. Naturally, they built their homes in the new country as much as possible like those they had known at home. The main point of difference was the use of shingles or siding, instead of the exposed structure of half-timber work. This difference was, at least in the earliest houses, only on the surface. Under the covering of shingles on some of the oldest houses may be found typical half-timber walls. It is supposed that they proved after a few

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years to be inadequate protection from the bitter winters of the new country and were later covered with another layer, in the form of clapboards or shingles.

Aside from the wooden pendants below the overhang of the second story, the typical Pilgrim house is bare of decoration. The lack of ornament is not to be wondered at if one considers the hardships of early colonial life. Ornament of any sort indicates leisure, and one is safe in assuming that nobody had much spare time in those days.

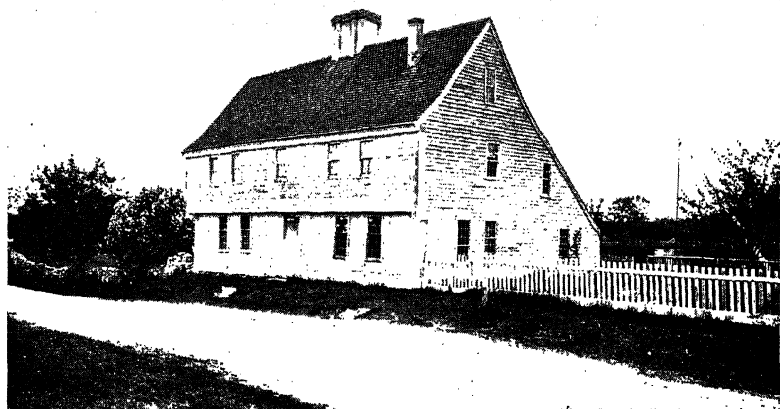


FIG. 107.—The "Scotch" Boardman house. Saugus, Massachusetts. Built 1651. (Courtesy of Society for the Preservation of New England Antiquities.)

The austere religious beliefs of the Pilgrims, also, must have furnished barren soil for the cultivation of the decorative arts.

The irregular shape of some of the older houses is usually the result of additions by later generations. L's at the side and the back were built on, as more space was needed. Sometimes the roof was extended down to cover a one-story addition across the back, as in the Boardman house.

The general arrangement of space in a Pilgrim house is shown in Fig. 108. The large central chimney provided flues for many fireplaces,

with economy of masonry work. The kitchen had to be large, for it was the family living room and workshop combined. Spinning and weaving and many other activities were carried on there, in addition to the preparation of food.

The small size of the windows in Pilgrim times forms the chief problem in today's use of the early colonial house. Modern heating

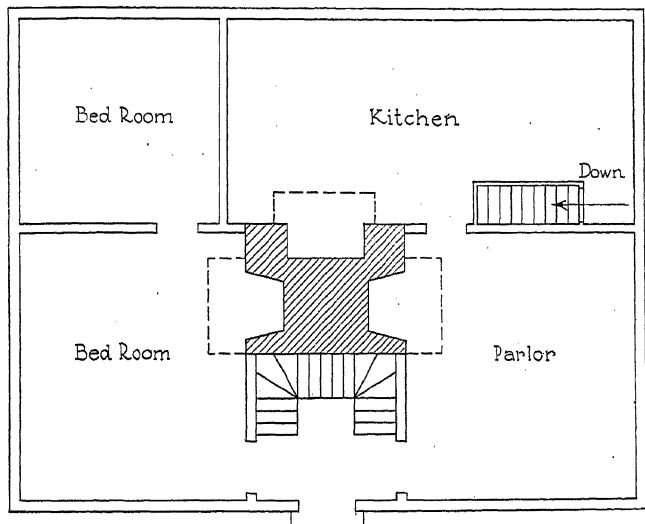


FIG. 108.—An early New England plan.

systems and modern ideas of planning call for larger window areas. As in the old English cottage, increasing the number of windows, rather than their individual size, seems to offer the best solution of the problem. The large central chimney, so necessary to the exterior design, interferes with circulation in the house. An interesting method of obtaining both a central chimney and a central hallway is found, in at least one instance, by joining two separate chimneys with an arch, in the attic.¹

The Pilgrim house has been reproduced to some extent in modern building, but it has never enjoyed (or suffered from) a popular

¹POWER, ETHEL B. *The House in the Mowing*. *House Beautiful*, February, 1922.

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Its beauty rests upon the inner qualities of structural integrity and sober massing. The untrained eye, in search of surface charm, does not always penetrate to these fundamental things. If you are tempted to say that the Pilgrim house looks like a barn, reserve your judgment until you are more familiar with it. Consider the clean, spare lines of the structure, the satisfying proportions, and the air of unpretentious dignity. It may be well to consider, also, how handsome some barns are, compared with some houses.

2 • THE GEORGIAN COLONIAL HOUSE

During the entire colonial period, England set the fashions for the American colonies. Clothing, furniture, and even houses were patterned after the styles that enjoyed popular favor in the mother country. We have seen that the early colonial houses resembled those of medieval England, but when the old style gave way to the new Renaissance fashion, American houses soon followed the English example in taking on classical characteristics.

In England the spread of the classic style produced a popular interest in architecture and decoration. Young men of wealth finished off their educations by making the "grand tour" down to Italy, and came back to England full of enthusiasm for Renaissance design. It became the fashionable thing to know something of architecture. Many wealthy amateurs designed their own houses. Books on the new style were published and soon found their way across the Atlantic Ocean. In the new country they were eagerly accepted by colonial builders and within a short time the designs of houses in America began to show their influence.

Colonial houses of the second period, as we have noted, are sometimes called "Georgian colonial," because they were patterned after houses of the Georgian period in England. In general shape they were solidly rectangular and formally balanced, like their English prototypes. The flattened gable or the hip roof was finished at the edge with a classic cornice or a balustrade. The doorway was the center of interest, with the same temple-front decoration that was used

in England. Large double-hung windows replaced the small casements of Pilgrim times. The Samuel Stetson house, Fig. 109, and the Dummer house, Fig. 110, are typical of the later New England houses.

Details of doorway, roof cornice, and windows were usually based on designs in the books mentioned above. The independent spirit that led the colonists to migrate to the New World did not keep them from leaning heavily on architectural ideas from the old.



FIG. 109.—The Samuel Stetson house. Hanover Centre, Massachusetts. Built 1694, enlarged 1716. (Courtesy of Society for the Preservation of New England Antiquities.)

Pediments were sometimes severely plain, and sometimes richly carved. Broken pediments, square tops, and elaborate scroll tops were also used. Fan lights came into use at the end of the century. Typical doorways of the period, in Figs. 111, 112, and 113, indicate the variety of design to be found in colonial doorways. The name of Samuel McIntire is connected with the best work of the classical style as it was adapted in New England. Born in Salem in 1757, he worked as a furniture maker, carver, and master builder.

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The design of the roof, also, exhibited considerable variety. Gable, gambrel, deck, and hip roofs were all used. While the general trend in the colonies, as in England, was toward the use of flatter roofs, occasionally one finds the steeper roof of the Pilgrim style combined with classic ornamentation on doorway and cornice. In some New



FIG. 110.—The Governor Dummer house. Byfield, Massachusetts. (Courtesy of Halliday Historic Photograph Company.)

England seaport towns, many a house that overlooked the sea had a railed platform, called the "captain's walk," built across the top of the gable roof. The platform afforded the earliest sight of returning vessels. The name "widow's walk," also applied to it, is a sober reminder of the hazards of a seafaring life, especially in those days.

In the Northern colonies, wood continued to be the principal building material for the small colonial house, especially in villages and the country. In the towns, the use of brick was extended as it

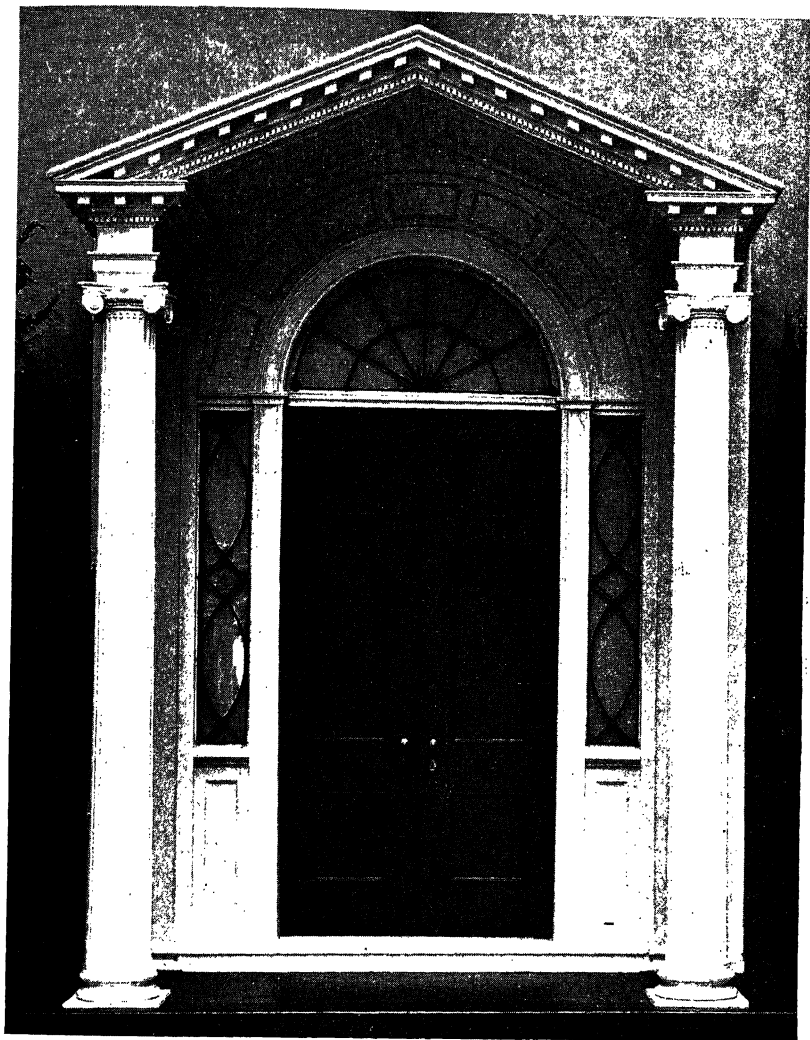


FIG. 111.—Doorway from the Bristol house. New Haven, Connecticut. 1800-1804. (Courtesy of Metropolitan Museum of Art.)

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became available. In Pennsylvania, stone houses took on classic decorations about the doorway and cornice, while in the South brick continued in use.

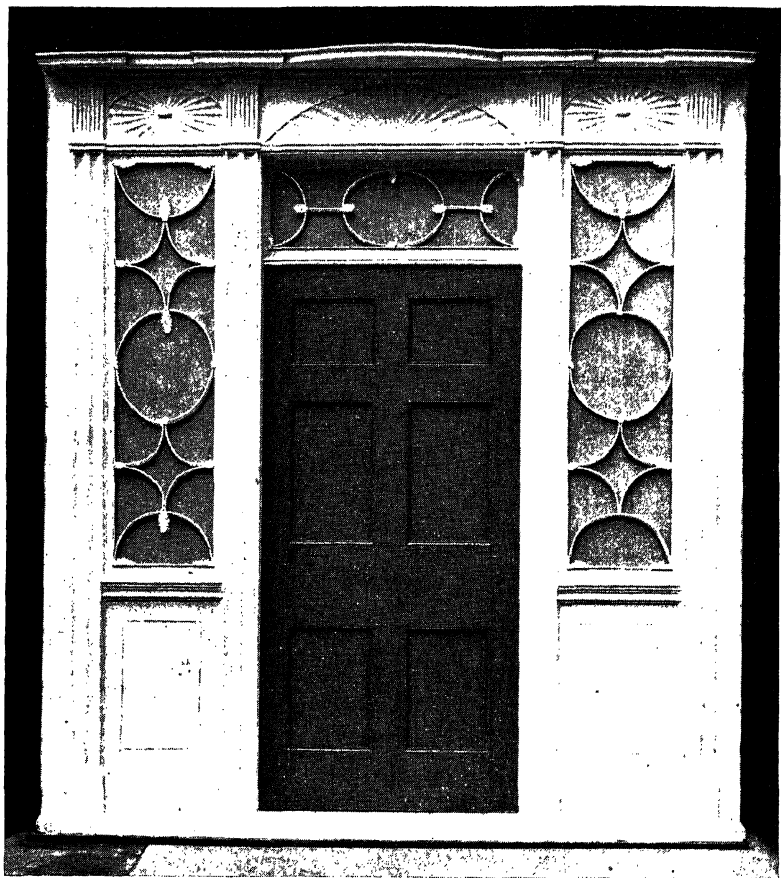


FIG. 112.—Doorway. Vaucluse, Portsmouth, Rhode Island. (Courtesy of Metropolitan Museum of Art.)

The temple-front doorway and the roof cornice already mentioned constituted the chief decorations of the later colonial house. Their elaborate carvings reflected the increased prosperity of the

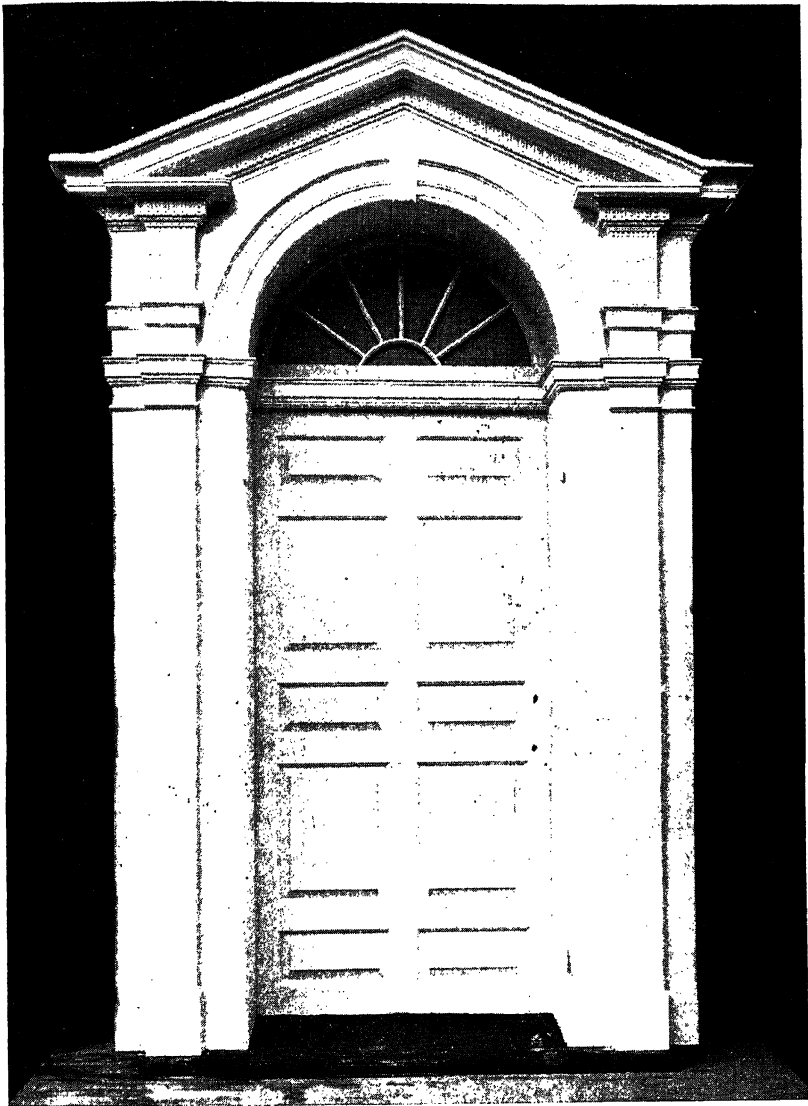


FIG. 113.—Doorway from the Runyon house. Trenton, New Jersey. Early nineteenth century.
(Courtesy of Metropolitan Museum of Art.)

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colonies. Life was no longer a desperate struggle to keep alive. A more orderly organization of society and easier financial conditions brought a demand for luxuries and refinements in houses, as well as in clothing and other articles of daily life.

The Georgian colonial style leads all others in popularity among modern home builders. The variety of materials and decorative details

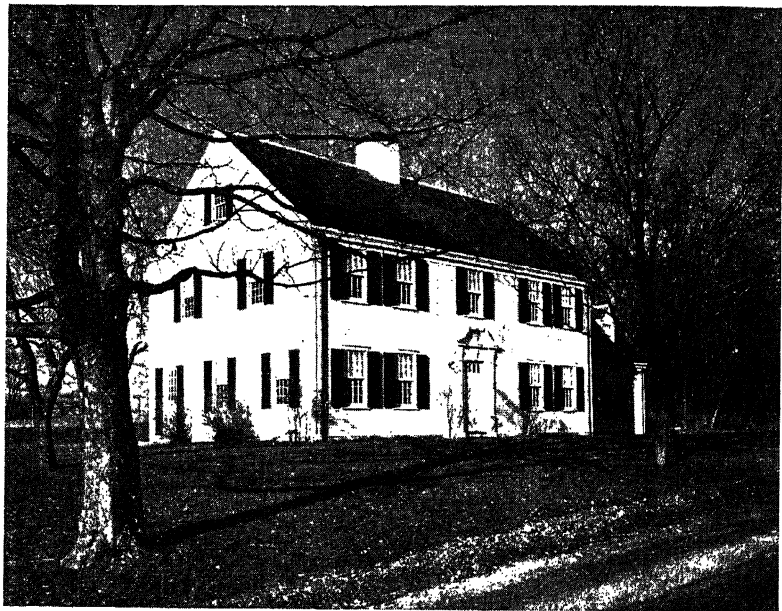


FIG. 114.—A modern use of the New England colonial style. (Will Rice Amon, architect; Walter H. Martin, engineer. Courtesy of Alexander Houses, Inc.)

to be found in the originals has provided the modern designer with a wide field to choose from. Building a colonial house need not mean literal copying of some old house. There is room for varied and individual interpretation by a skillful designer. Figure 114 shows a handsome, dignified modern house of the New England colonial style.

The term "colonial" has been loosely applied to any white house with green shutters. The proper use of the style, however, involves more than that. The details of cornice, windows, and doorway call

for skillful treatment by a trained designer. The edge of the roof, for instance, has a small overhang, and is always neatly finished with a cornice. Wide eaves and protruding rafter ends in the bungalow manner are enough, in themselves, to spoil a colonial house. The size and decoration of the cornice depend upon the size and style of the

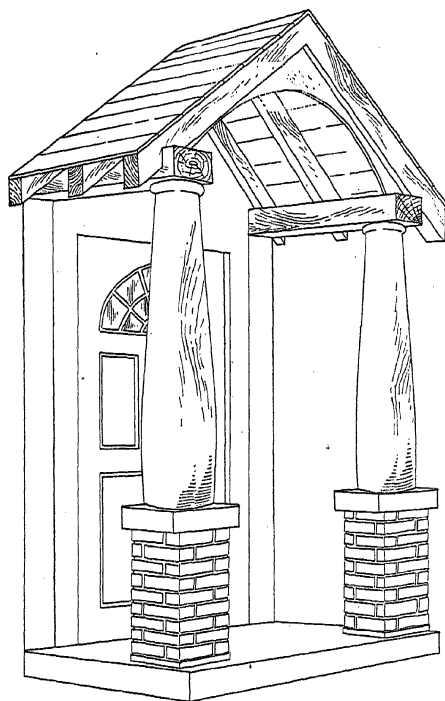


FIG. 115.—A sampler of errors—a “colonial” doorway.

house. A cornice may consist of a simple group of moldings, or it may be an elaborate affair of dentil courses and carved ornament. Windows are placed singly and are divided into small panes *all over*.

The traditional arrangement of the parts of a pediment over a door are shown in the doorways illustrated. While a gifted designer may take liberties with these forms, it is best for the untrained builder to follow closely some good example. Figure 115 might be

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called a composite portrait of many faulty colonial doorways—a sampler, so to speak, of what not to do. First, the pediment is a haphazard structure of odd pieces of lumber, instead of a meticulous joining of moldings. Second, it is too sharply pointed. Third, the curve of the arch is weak. It should be either an exact semicircle or a graceful flat arch with the curve of a half ellipse. The brick piers also show an indignity sometimes inflicted on a column. For beauty and grace, columns must be given their full length.

The scale and ornateness of the decorations depend on the materials, as well as on the size of the house. On frame houses, small and delicate detail is best. Heavier frames for window and door and more ornate cornices and doorways are appropriate for brick houses. For the rugged character of stone walls, heavy but simple details are suitable.

3 • COLONIAL COTTAGES

The recent trend toward smaller houses has revived interest in the cottages of colonial times. The most popular model for modern builders is the little frame house of New England, usually called the Cape Cod cottage. It may be described as a smaller and simpler version of the early New England colonial house. The Cape Cod cottage was either a one-story or a story-and-a-half house, with a plain gable roof. Siding or shingles covered the walls. Usually, the front of the house was formally balanced, with the door in the center and one or two windows on each side. The doorway detail varied from the simplest sort of frame to a quiet and restrained use of pilasters and moldings taken from classical ornament. A row of windowpanes above the door or up and down each side was sometimes used. Small-paned, double-hung windows with wooden shutters were typical.

For all its small size and lack of pretentiousness, the Cape Cod cottage has a dignified sedate personality. A more satisfactory model for a small house can scarcely be found. Figure 116 pictures a typical old Cape Cod cottage. Some of the details that contribute to the pleasant appearance of this house are the low foundation, the moderate slope of the roof, and the small, neat finish at the roof's

edge. The rather small windows and the simply designed doorway are in scale with the size of the house. A steep roof and a wide overhang, with exposed rafter ends, are to be avoided. Elaborate Georgian doorways of the type shown in Figs. 111, 112, and 113, beautiful as they may be on large, two-story houses, are out of place on little cottages.

Dormer windows were not typical of the old Cape Cod cottage, but they are sometimes used today for additional light and air on the



FIG. 116.—An old Cape Cod cottage. (From "*Cape Cod in the Sun*," by Samuel Chamberlain. *Hastings House*. New York, 1937.)

second floor. If they are small and unobtrusive, they are not objectionable. On the front of the house, dormers should be limited to the single type. A large shed dormer is so out of harmony with the Cape Cod style that it cannot be used on the front of the house. If such a dormer is needed for extra headroom, it should be kept on the back of the house.

White siding or weathered brown or gray shingles are the usual materials used for the walls. Dark roofs and green shutters are best for completing the color scheme.

4 • THE DUTCH COLONIAL HOUSE

A recent survey of popular taste has shown that the so-called Dutch colonial house still occupies a warm spot in the affections of the American people. The particular feature that distinguishes the Dutch colonial house from other colonial types is the gambrel roof, built on two slants. While the term "Dutch colonial" has been used for many years to describe gambrel-roofed cottages, there is no evidence, according to Fiske Kimball, that the gambrel, or curb, roof was limited to the houses of the Dutch settlers. It was, in fact, used generally throughout the colonies.

While the Dutch colonial house has been considerably altered by the passage of more than 200 years, it is still a most attractive model for a small house. There is something comfortable and sturdy about its outline, when it is properly designed. Many of the early gambrel-roofed cottages had no dormer windows, because the attic was used mainly for storage (see Fig. 3). Today, with the addition of dormers, it is almost invariably made into sleeping rooms. The addition and enlargement of the dormers constitute the chief difference between the old and the new uses of the style, and also the chief cause of failures in the working out of a satisfactory design for the house.

The Dutch colonial house is not a full two-story house. Even as it is often used today, with shed dormers at front and rear, it cannot have a complete second floor. It is essentially a cottage type, and was never meant to be a mansion. It might be called a story-and-three-quarters house. Attempts are sometimes made to dress up a two-story house to imitate the Dutch colonial, with strips of roofing draped down the sides and across the front. They serve no structural purpose. The pseudo dormer is, in reality, a full second floor extending directly up from the first. Such treatment produces a large, prominent dormer, much too wide and heavy for the house. If a shed dormer is to form a pleasing part of a design, it should be kept subordinate to the main mass. It must, therefore, be smaller than the first floor.

It is obvious that, if the dormers are to be smaller than the first floor, the corners of the second-floor plan must be cut out. They are not a complete loss, for they may be used as closets. If one is not willing to sacrifice a few square feet of floor space at the upstairs corners, it would be better to choose another style that is frankly a two-story house.

The size and proportions of the plan influence the appearance of the Dutch colonial house. An oblong shape is better than a square one, for it provides the dominant horizontal lines that add much to the exterior. A square plan is likely to appear chunky and awkward. In order to allow the broken lines of the gambrel roof to spread in a graceful fashion, a certain depth of plan is also needed. A plan only 18 or 20 feet deep, for instance, is scarcely large enough for a gambrel roof. A depth of 25 feet is desirable.

Turning from major questions of size and proportion of the main mass to matters of detail, we find that the relative length of the two parts of the roof, the width of the cornice, and the doors and windows may be made to contribute to the success of the design. A more graceful roof line is obtained by using a short line above and a longer line below, than by reversing their proportions. The cornice at the ends of the roof should be kept small and trim. If it projects too far out at the ends (as it is bound to do in the case of the fake Dutch colonial mentioned above), the house will seem cumbersome and top-heavy. In the average small house a projection of 6 inches is ample for the end cornice. The eaves, however, may sweep out in a wide curve, to project several feet beyond the front and back walls. This projection forms the "stoop" so characteristic of the old Dutch houses.

If it is possible to get along with less space upstairs, single dormers are in many ways more desirable than one large shed dormer. Naturally, they do not add any large amount of floor space to the rooms. They are simpler to handle as a part of the design, for they may be more easily subordinated to the main mass of the house. Many people compromise on the question of dormers. On the front, they use

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single dormers; and on the back, where additional floor space is often needed, they use a shed dormer.

The doorway and windows of the Dutch colonial house are similar in style to those of other colonial styles. Rather small double-hung windows, divided into small panes, are suitable. The doorway, ordinarily in the center of the formally balanced façade, should be simple and unassuming, to suit the cottage atmosphere of the house. Often, decorative details of classical derivation are used; but they are not necessary. Whatever the decorations are, they should fit neatly into the space given them.

In the matter of color, the Dutch colonial house follows the lead set by other colonial houses. Frame houses are usually all white, with the traditional green shutters, or some light grayed color, with white trim. Brick and stone are sometimes used for the main body of the house, with wood, of course, in the dormers. Soft-red brick, with white or cream shutters on the first floor to match the color of the dormers, makes a pleasing color scheme.

5 • NINETEENTH CENTURY HOUSES

The colonial period, historically speaking, came to an end with the winning of independence by the colonies, and the following 40 or 50 years are known as the Federal, or the Greek revival, period. During that time a fresh wave of interest in Greek architecture spread over the country. The Greek and Roman decoration of the later colonial house had come to America by a roundabout route, through the Italian Renaissance and then through the seventeenth-century designers of England. Like the English architects of the Regency, American architects went directly to the Greek temple for their inspiration.

While it is true that Greek forms of ornament were used on the late colonial house, they were used in miniature, so to speak, as decorations applied to the surface of the house, rather than as parts of the structure. The Greek-revival house differed, in that its entire form was patterned after the Greek temple. Two-story columns supporting a flattened gable roof formed a tall porch across the front, or

sometimes around three sides of the house. Details were simple and large in scale. In some houses the wood siding of the walls was cut to resemble blocks of stone. Two houses of the Greek-revival period are shown in Figs. 117 and 118.

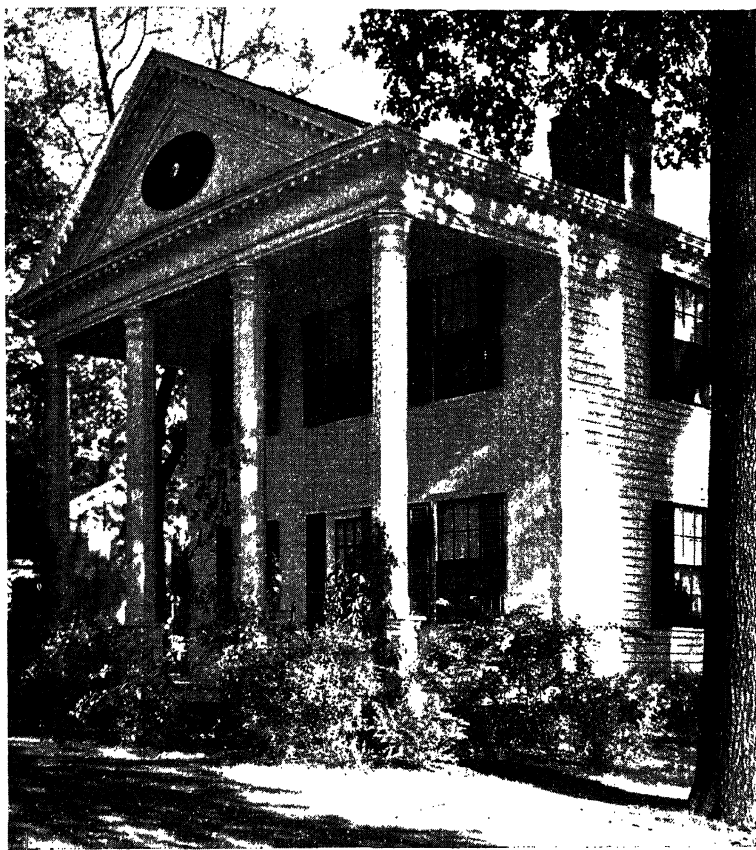


FIG. 117.—The Greek temple form in an early nineteenth century house. (From "Early Homes of Ohio," by I. T. Frary. Garrett & Massie. Richmond, Virginia. 1936.)

Thomas Jefferson's interest in Greek architecture was an important factor in the development of the Greek-revival style.

"Thomas Jefferson—about 1779, made a sketch for the remodeling of the Governor's house at Williamsburg. In this he planned rows

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of eight columns across the entire front and rear, and specified a pediment roof running from colonnade to colonnade. . . . Here, years before it would elsewhere reappear, Jefferson resurrected the temple of the ancients to be used for dwelling purposes. In it lies the distinctive characteristic of the classic Revival that was to follow—a pediment carrying through and roofing the building without breaks.



FIG. 118.—A Greek-revival house. A portico is suggested by the two-story pilasters. (From "*Early Homes of Ohio*," by I. T. Frary, Garrett & Massie, Richmond, Virginia, 1936.)

Previous to this sketch, this method of roofing had not been attempted. The pediment had heretofore been independent of the roof and abutted against it, the building being invariably wider than the portico."¹

In many smaller houses the temple form was not followed strictly. Sometimes, in place of a portico, two-story pilasters were used against the façade (as in Fig. 118). Other features in which the Greek-

¹ MAJOR, HOWARD. *Domestic Architecture of the Early American Republic*. J. B. Lippincott Company, Philadelphia, 1926.

revival house differed from the Georgian were the extremely flat roofs, larger windows, and simpler, bolder types of ornament.

The Greek-temple form is not suitable for the small, inexpensive house of today. In Northern states, large two-story porticoes shut out too much sunlight. They are more useful in hot climates, where shelter from the sun is needed, but classical columns and other details cost too much for small houses, in which economy must be considered at every point. As a manifestation of a period in American history, however, the temple house presents a most interesting field for study.

The smaller and less pretentious designs of the early nineteenth century may easily be adapted to present-day needs. In general, they resemble English Regency houses, with flattened roofs, large windows, and great simplicity of detail. Like the Regency house, the Greek-revival house lends itself very well to free modern interpretations.

The Greek-revival house went out of fashion about 1850. The series of styles in house design that followed are usually lumped together and called "Victorian." It is not necessary to describe them here, for examples of Victorian Gothic design, the French Victorian style, gingerbread trimming, and the heavily bracketed houses of the end of the century survive in almost every town. It is obvious that during this period a profusion of ornament was mistaken for beauty. Simplicity, good proportion, unity, balance, and harmony did not appeal to the Victorian eye.

About 1900 a reaction to the architectural excesses of the Victorian period set in, in the form of the mission bungalow. All applied ornament was swept away, and the structure of the house was considered its own excuse for being. Flat boards replaced the moldings around doors and windows, and honesty of design was shown by such things as massive porch pillars and exposed rafter ends under the wide-spreading roof. (As a matter of fact, they were often not the real rafters at all, but little sticks tacked on to imitate them.)

After the bungalow period, and until the present day, the older styles, such as the colonial, old English, Spanish, and French, have been the principal influences in house design in America. In late

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years, however, the modern style has become established as a serious rival of the traditional styles.

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The Modern House

THE terms "modern" and "international" have been applied to a new movement in the designing of houses. This movement is based on the desire to evolve plans and exteriors that are consistent with new building materials and modern machine processes, and with new ways of living. Modern house design is sometimes misinterpreted as being merely an attempt to depart from tradition—in other words, to be "different." Although one cannot help feeling that this motive is sometimes present, and that some features of exterior design have been laboriously dragged in, the fundamental idea of modernism goes much deeper. It is an honest and serious attempt to approach the whole problem of the plan and exterior with a new vision, in the light of modern conditions, based on the belief that the exterior design should be the result of the plan, the materials, and the methods of building used.

The appearance of the Tudor house, for instance, was a direct result of building by hand with wood, stone, and brick. The steep roof shed the rain before it could soak through the imperfect covering. Small windowpanes were used because glass could be made only in small pieces. Today wood and stone are being replaced by machine-produced steel, concrete, and plastics. Watertight, heat-insulated flat roofs are a commonplace. Glass is made in huge sheets, or it may

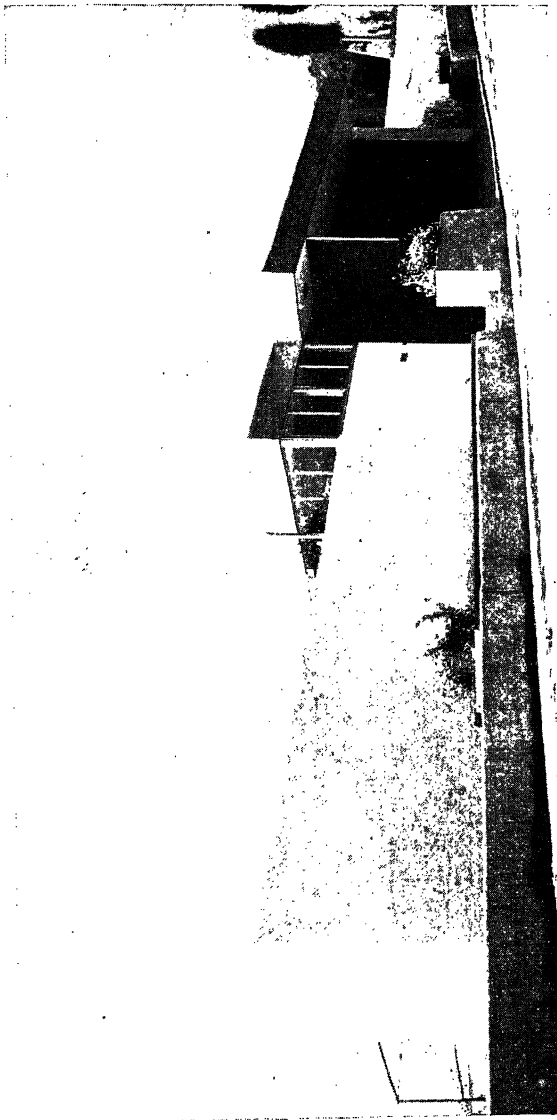


FIG. 119.—A Modern house on a steep hillside. This view shows the street level, with the front door and the garage entrance side by side.
(Richard J. Neutra, architect.)

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be used in the form of bricks, as in Figs. 41 and 42. It is only natural that new materials and methods should produce new exterior designs.

"Architectural tradition is based upon the wall accepted as the main support of the building structure. The walls of the past, being structural, were designed to express massiveness by a contrast between solid and void, and the solidity was accentuated by infre-

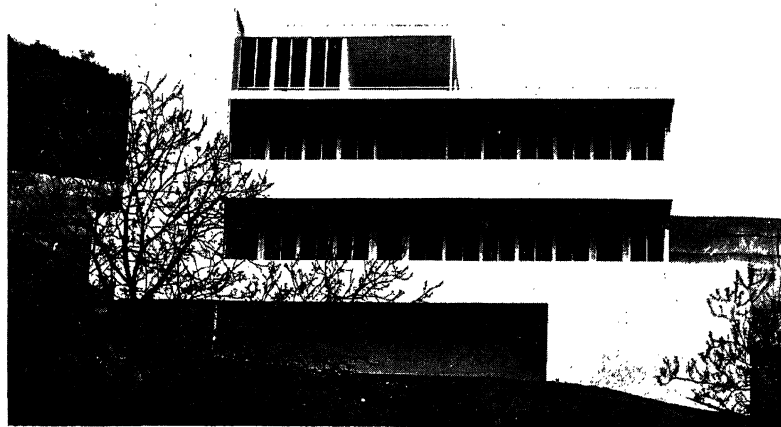


FIG. 120.—The other side of the same house. View windows overlooking Hollywood and the ocean, as seen from below. (*Richard J. Neutra, architect.*)

quent piercing and deep reveals. The expression of the wall as a thin sheathing, of no more structural importance than the window, is a manifestation of modern constructional methods. The function of the wall has changed; it is a thin skin, hung on a framework instead of standing on a foundation . . . The wall surface is regarded aesthetically as a continuous plane; as a skin enveloping and expressing the surface of a volume.

"The placing and size of windows are no longer governed by the requirements of symmetry; the glass becomes part of the continuous

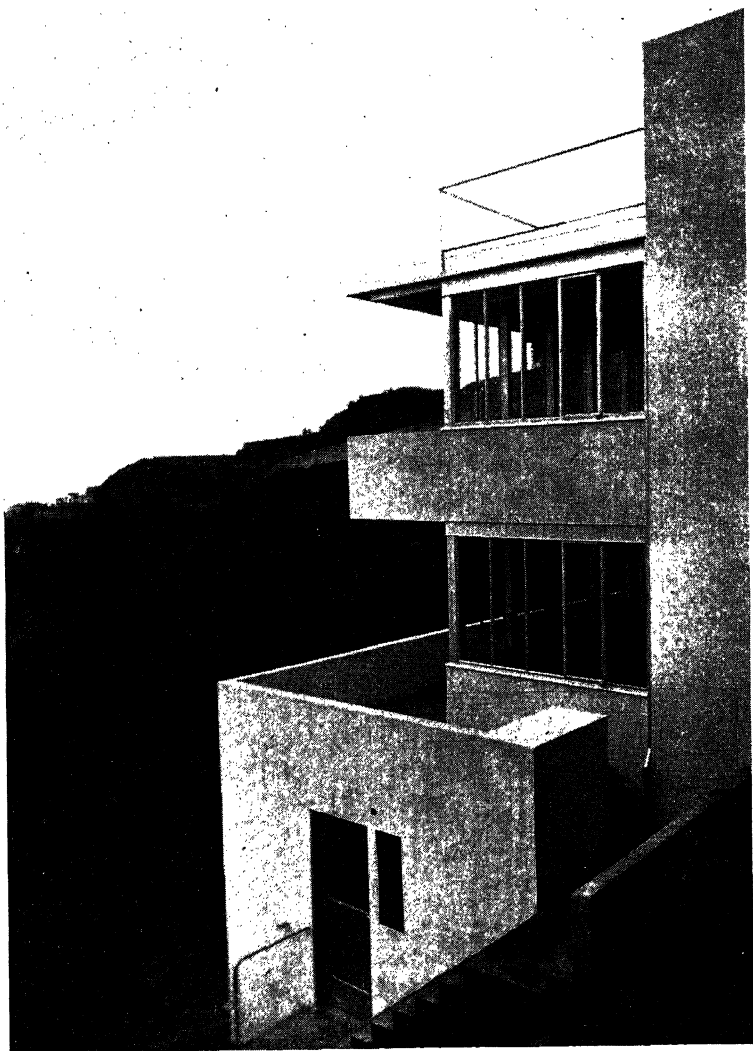


FIG. 121.—Projecting balconies protect the windows from the glare of the sun. (*Richard J. Neutra, architect.*)

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enveloping membrane, flush with the outer face, and the contrast between window and wall surface, which tends to emphasize the massiveness of the wall, is much reduced by this arrangement."¹

Figures 119, 120, and 121 show three views of a brilliant modern design for a house built on a steep hillside. The garage is on the roof, at the street level, and one descends first to the living room floor, and then down a flight of steps to the bedrooms. The continuous window area commands a spacious view. The overhang of the balconies shelters the windows from the glaring sun.

The essence of modern design does not lie in external appearance, but in the plan. In the light of modern living conditions, the architect works out the best arrangement of space within the house for the particular family that is to live in it. Smaller families, for instance, need a smaller number of rooms. Since high building costs have compressed the plan into a smaller area, a feeling of spaciousness can be achieved only by throwing several rooms together; hence the "open plan." The open plan, as well as large window areas, is made possible by efficient modern heating systems. The daily use of motorcars, combined with modern habits of outdoor living, has swung the house around to face the back of the lot, and has brought the garage close to the street. Interest in outdoor living is reflected also in the use of flat roofs as decks. Such use, however, is by no means new.²

The modern style, as far as the exterior appearance is concerned, is characterized by square, boxlike shapes, flat roofs, large plain wall areas, and great restraint in the use of ornament. Materials are used in the most simple and direct manner, with no attempt to conceal their character. Large window areas are introduced on the sides which afford the best view or breeze or sunshine, while the house may present a blank wall to the street. The entire garden side of the living room, for instance, may be of glass. Figure 122 shows an interesting use of large areas of glass in windows and mirrors. Designs vary from an extreme functionalism, where the exterior shows a

¹ YORKE, F. R. S. *The Modern House*. Architectural Press, Ltd. London. 1934.

² "Peter went up upon the housetop to pray." Acts 10: 9.

THE MODERN HOUSE

grim determination to express the plan, come what may, to a conservative style, known as "classic modern." This latter term denotes a sparing use of a large-scale, simple, Regency type of classical detail on houses whose main structure must be called modern. In the classic modern style the plan is to some extent modified by the exterior, because formal balance is usually employed on the façade.

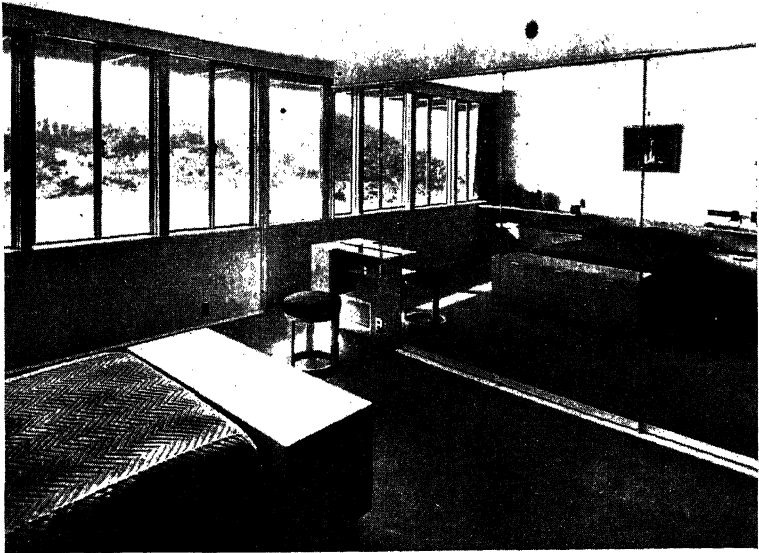


FIG. 122.—Modern use of glass in large mirrors and continuous window areas. (Richard J. Neutra, architect. Courtesy of Libby-Owens-Ford Glass Company.)

It is not fair to condemn the modern style after one hasty glance. The movement is too serious and too important to be set aside with remarks about cracker boxes. To be sure, it takes a little time to get used to new ideas on planning, and to exterior designs so different from those one is accustomed to seeing. The planning, construction, and design of houses have lagged far behind human progress in other fields. An art cannot stay alive and grow, merely by copying what has been done before. The simplicity and directness of the

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modern style are a welcome relief from the cheap imitations of Spanish and Tudor designs that were recently popular. The use of new forms should serve to release the architect from the restrictions imposed by traditional designs. If he is not hampered by preconceived notions of how a house ought to look on the outside, he will be able to achieve a better use of the space within.

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The Architect's Contribution

THE exercises in drawing floor plans and exterior elevations in the earlier pages of this book are not intended to fit the layman for designing his own house. They are meant, instead, to prepare him to cooperate with an architect, when the time comes for building a house, helping the layman to organize his own ideas and preferences. A house is far too difficult and complicated an undertaking for anyone who has not had special training, and making a few sketches of plans and elevations is in no sense a substitute for that training.

When the building allowance is limited, the owner may be tempted to try to get along without the services of an architect, in order to save the cost of his fee. Such a policy is false economy, for a good architect who is experienced in designing small houses contributes the full amount of his fee in the service he gives. He will work out the best possible floor plan for the particular site, and will help the owner to obtain the best materials and construction for his money. In addition, he will contribute the beauty of design so conspicuously lacking in most houses that come into being without the guidance of an architect. He also draws up forms of proposals and contracts, issues certificates of payment, and generally manages the work.

An architect is usually chosen on the basis of work he has done in the past. Friends who have built recently may recommend him, or

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examples of his work appearing in magazines may attract the attention of the owner. The prospective home builder should select his architect as carefully as he selects his doctor or his lawyer. Usually a local architect is found, but if one living at a distance is employed, his traveling expenses in connection with his work on the house are paid by the owner.

Having selected an architect, the owner should give him complete information as to the problem, using his own trial sketches of plans and elevations, as well as clippings from magazines, to illustrate his ideas on the appearance of the house. The architect will then make a set of preliminary sketches of plans and elevations, embodying as many of the owner's ideas as he can. In the course of a few discussions between owner and architect, these preliminary sketches will be worked over and altered until they are satisfactory to the owner. With the owner's approval given, the architect prepares working drawings in exact scale, usually $\frac{1}{4}$ inch to 1 foot, showing complete floor plans and elevations. Working drawings are made on tracing paper, and from them blueprints are made for the use of the builder. Small details of construction and design are also drawn, on a larger scale than that of the floor plans. The placing of the plumbing and heating systems and the electrical wiring are shown on the plan, although some of the details of installation must be left to the special contractors in those fields.

An important part of the architect's work is the writing of building specifications. The owner should study the typewritten booklet that accompanies the blueprints as carefully as he studies the plans. Specifications consist of exact and detailed instructions as to the materials and methods of construction to be used in the house. The proportions of sand, cement, and gravel to be used in concrete work; the size, species, and grade of lumber for each part of the framing; the brand name of special materials, such as insulation and hardware; and a hundred other details are taken care of in the specifications. These, together with the blueprints, form the main part of the building contract, and for that reason their importance can scarcely be over-

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estimated. It would be a good plan for every prospective home builder to borrow a set of specifications from some friend who has built a house, and study them, before he embarks on his own building venture.

Next, plans and specifications are submitted to building contractors, for bids. A local architect knows the work of the various contractors by his experience and will help the owner select from three to six reliable firms for bidding. Usually, the lowest bid is awarded the contract, although this is not always the best policy. An extremely low bid, much lower than any of the others, may indicate that the contractor intends to make up the difference by skimping on materials or workmanship. In such a case, it would be better to pay more and be certain of good work. The integrity of the contractor is of the utmost importance to the owner.

If a general contractor is employed, he will in turn employ subcontractors for the various types of work, such as masonry, carpentry, and plastering. If the owner is able to give a great deal of time and attention to the building of the house, and if he knows a great deal about construction, he may prefer to do the work of the general contractor himself and deal directly with the subcontractors. Such a policy is scarcely practicable for the average person who has a full-time job of his own.

After the building contract has been signed, construction work usually begins promptly and should continue rapidly until the house is finished, for it is to the owner's advantage to take possession of the house as soon as possible. Usually, the contract specifies a definite date for the completion of the house, so that the contractor or the workmen will not be tempted to spend part of their time on other jobs that may turn up. A well-organized construction company can build a number of houses at one time without delay, but in the country and in small towns building organizations are less tightly knit. It is very annoying for the owner to find his house at a standstill because the carpenters have taken a few days off to do a little remodeling job for someone else.

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If the architect is employed to supervise construction, he will visit the house at reasonable intervals, giving his approval for various parts of the work, or withholding it if the terms of the contract have not been complied with. Ordinarily, the specifications call for the written approval of the architect before payments are made by the owner. If it is necessary to make changes in either the plans or the materials after building operations have started, such changes should be authorized in writing by the architect. The owner should not give orders for changes to the contractor or the workmen. Supervision of building by the architect does not mean that he will spend every day at the house to see that every nail is driven properly. Neither does it mean that he is responsible to the owner for the quality of the contractor's work. The building contract lies between the owner and the builder. The architect supervises the latter's work, but he does not guarantee it.

There are many reasons why a written contract between owner and architect is desirable. The average layman is not familiar with the details of architectural practice and may ask for extra services without realizing that he is doing so until he receives the bill. He may require changes in the plans after the blueprints have been drawn which necessitate their being redrawn, or he may ask for an unreasonable number of preliminary sketches. When the owner employs an architect without definite knowledge of what he has a right to expect and what he will have to pay, as well as what are the duties he owes to the architect, the way is opened for all sorts of misunderstandings. A standard form for a contract between architect and owner has been prepared by the American Institute of Architects, the national professional architects' society.

The duties of the owner consist chiefly in giving the architect complete information as to the amount of money he wishes to spend, the size of his family, and his way of life. He should also furnish "an accurate survey of the building site, giving the grades and lines of streets, pavements, and adjoining properties; the rights, restrictions, easements, boundaries, and contours of the building site, and full

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information as to sewer, water, gas, and electric service.”¹ He also owes it to the architect to make his decisions and return preliminary sketches with reasonable promptness.

An architect's fee is usually a certain percentage of the cost of the house, for drawing the plans and writing specifications; and a higher percentage if he supervises construction. For remodeling, charges are usually higher than for new work.

Trouble may arise between architect and owner if the contractors' bids are much higher than the architect's estimates. Sharp rises in material and labor costs may occur between the drawing of the plans and the figuring of costs by the contractors. Sometimes the plans start out modestly enough, well within the price limit, but one by one extras are added at the owner's request until finally the cost is far beyond the original estimate. An architect who is wholly in sympathy with his client's desires may not be hardhearted enough to deny him what he wants. Building costs are by their very nature rather nebulous.

“ . . . Opinions as to the value of a given piece of work may, with entire honesty, vary greatly. If the highest and lowest bidders, with careful working drawings before them differ, as they often do, by 30 or 40 per cent, how can it be wondered at that preliminary estimates made from mere sketches should show wide variations from the lowest bid.

“Therefore, while the architect owes his best efforts to the owner in so important a matter, the owner must in justice forbear hasty judgment if the architect fails to display the gift of divination.”²

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Materials and Construction

WHILE many experiments are being carried on in order to develop new materials and more efficient methods of building, the average homeowner today still must choose between two traditional classes of construction: masonry work and wood framing. It is true that these methods are wasteful and inefficient and that the application of modern factory processes to building would bring about a badly needed reduction in the cost of houses, but pioneering in building involves too great a risk for the limited budget.

Building magazines of five or ten years ago supply a strong argument for conservatism. Their advertising pages offered dozens of new building materials for which most extravagant claims were made. Practically all of them were expected to revolutionize home building, and practically all of them have long since vanished from the market. It is unwise to risk either the structural value of the house or any substantial amount of money by using new and untried materials.

While modern transportation systems make possible the use of any material anywhere, the choice of materials for a house depends largely on their comparative local costs, which in turn are governed partly by freight rates. The stone houses of Pennsylvania and the wood houses of timber regions are evidence of the importance of local resources. It is generally more economical, also, to build in the style

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to which local artisans are accustomed. A contractor faced with specifications for unfamiliar materials or methods is likely to present a higher bid than he will for work he is acquainted with. In some cases, the choice of materials is limited by local building codes.

In general, masonry construction costs more than frame, but its advantages are obvious. Longer life, smaller maintenance costs, and lowered fire insurance rates may be balanced against the lower first cost of a house of wood. (In this balancing, perhaps a money value should be given to the freedom from worry that goes with fire-safe construction. Every time the fire whistle blows the nervous owner of a frame house thinks, "Is my house burning?") Truly fireproof construction, however, cannot be had with masonry outer walls alone. Anyone who has seen an old-fashioned brick house burn knows that there is enough wood in floor joists, partitions, and trim to make a spectacular fire. The fireproof house of today has concrete floors, concrete or steel joists, and partitions of hollow tile, in addition to the masonry outer walls. Such houses are especially desirable in the country.

Certainly the advantages of fireproof construction are so great that it is worth while to investigate the cost before building. The difference in price between wood and fireproof construction may not be so great as one imagines.

Masonry outer walls may be of stone, solid brick, concrete (either poured or block), or hollow tile, faced with stucco, brick, or other surface. Cinder blocks, made of cinders and cement, are also being used. Poured concrete is expensive chiefly because of the cost of the forms. Some work has been done with metal forms which may be used over again.

Solid brick walls for small houses may be 8 inches thick, unless the building code requires 12-inch walls. Eight-inch walls are seldom watertight. There are many different kinds of brick, according to their surface, their composition, or the degree of burning. Face brick is made in a variety of colors and textures and is intended for the outside surface of a wall. Common brick is plain red in color, with a fairly

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smooth surface. Good grades of common brick are hard enough for outside surfaces. Soft or salmon brick is underburned, and should not be exposed to the weather. The pattern of brickwork may be varied in a number of ways, based upon the four types of bond shown in

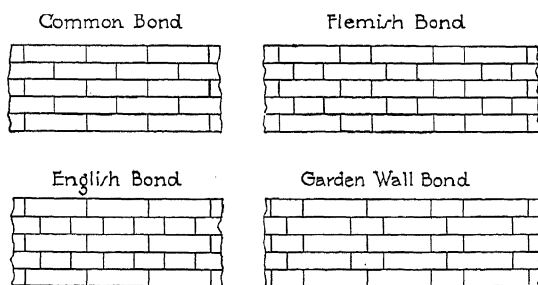


FIG. 123.—Brickwork patterns.

Fig. 123. The thickness of the mortar joint and the color of the mortar are other factors in the appearance of a brick wall. The mortar joint may be left flush with the surface, or it may be cut in a variety of ways, as shown in Fig. 124.

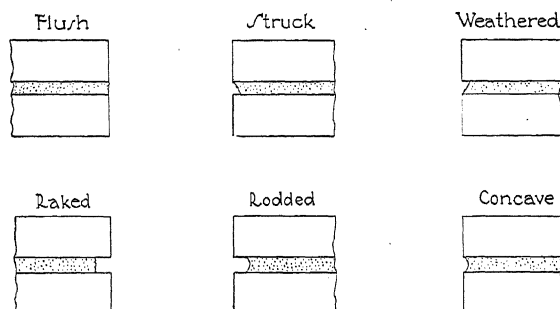


FIG. 124.—Mortar joints.

The lumber used in house construction is generally soft wood. It is roughly divided as to quality into two groups, select and common. Grading is done according to the number and size of knots, cracks, decay, and other blemishes. Select lumber contains only a few small, tight knots, and is suitable for interior trim, cabinets, and

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other built-in furniture. Number one common lumber is ordinarily used for girders, joists, and rafters; while numbers two and three common are used for rough coverings, such as sheathing and sub-flooring. The principal lumber manufacturers stamp every piece with a mark indicating the grade and the mill from which it came.

The quality of lumber is affected by the manner in which it is cut from the log. If a piece is cut approximately at right angles to the annual rings, it is called edge-grain or, in the case of oak, quartersawn. If it is cut parallel to the rings, it is called flat or common sawed. See Fig. 125. Edge-grain lumber is better than flat sawed, for it shrinks less, •

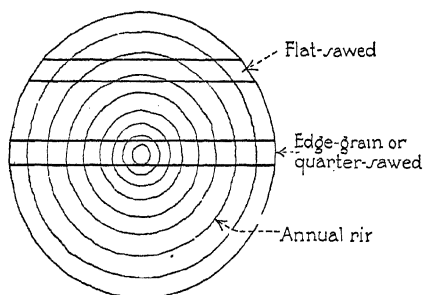


FIG. 125.—Methods of cutting lumber.

wears better, and has less tendency to warp and to splinter. It is also more expensive.

A frame house may be considered reasonably safe from disastrous fires, at least in towns, if a number of precautions are taken in building. The hollow spaces between the studs and the joists offer an easy passage for the spread of fire, especially for fires that begin in the basement. They should, therefore, be filled in at each floor level and at the edge, with an airtight fire stop.

Since the chimney itself is the chief source of fires, special precautions should be taken in building it. Two layers of brick, or one layer surrounding a fire-clay flue lining, are recommended. No wood should be built into a chimney or even touch its outside surface (see Fig. 126). All joists and rafters should be framed around the chimney, leaving a 2-inch air space, to be filled with incombustible fire stopping.

"The greatest obstacle to securing efficient fire stops in a building is in getting architects and builders to realize the supreme importance of such precautions. The ordinary carpenter or builder is ignorant of the serious annual life and property loss due to fires in combustible dwellings, and considers the possibility of such a fire too remote to worry about. Someone must be responsible for rigid inspection to



FIG. 126A.—Wrong. A flagrant violation of good building practice as well as of fire laws. Joists bedded in chimney cause sagging floors and plaster cracks, and constitute a serious fire hazard, for wood structure and masonry never settle the same amount. (Courtesy of Alexander Houses, Inc.)



FIG. 126B.—Right. Proper framing around a chimney. No wood touches the brickwork. Chimney and frame are allowed to settle separately. (Courtesy of Alexander Houses, Inc.)

insure that such work is conscientiously performed. Wherever possible the building inspector should be required to inspect all fire stopping before it is concealed from view. Usually the owner lacks experience and does not know what should be required."¹

If all the electric wiring is installed according to the specifications of the Fire Underwriters' Code and inspected before it is covered up, the danger of fires from faulty wiring will be eliminated. A layer of asbestos or of gypsum plaster on metal lath on the basement ceiling is useful for keeping fires from spreading to the upper floors.

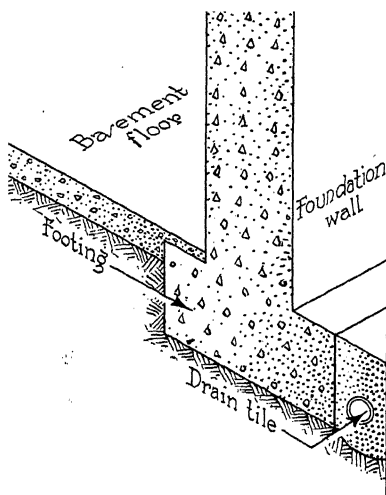
¹ Recommended Minimum Requirements for Small Dwelling Construction. *Building and Housing Publication 18*. Bureau of Standards, U. S. Department of Commerce.

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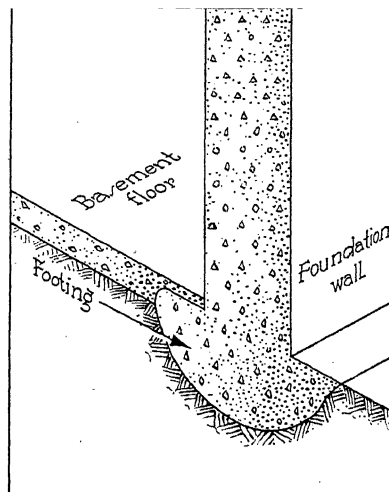
Naturally, everyone who builds a house wishes it to be soundly constructed and durable, without costing too much. When a house is built without a price limit, the utmost in strength may be expected. The average owner, however, cannot afford to put more money into a house than he can reasonably expect to obtain for it if selling should become necessary. He must strike a balance between extra strength on the one hand and its extra cost on the other.

Usually, before building there is a painful interlude that might be called the paring process, when smaller rooms and less expensive materials and finishes are called upon to help coax contractors' bids down nearer the level of the original estimates. It is unwise, however, to lower the cost of the house by substituting doubtful methods of construction and barely adequate lumber sizes for those actually required for sound building. Skimped construction must be paid for, after a few years, by higher maintenance costs, as well as by the annoyance of sagging floors, cracked plaster, and doors that stick or will not shut.

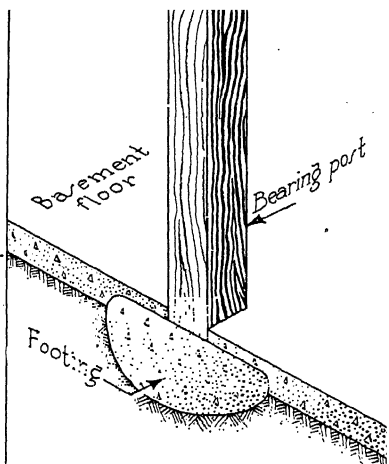
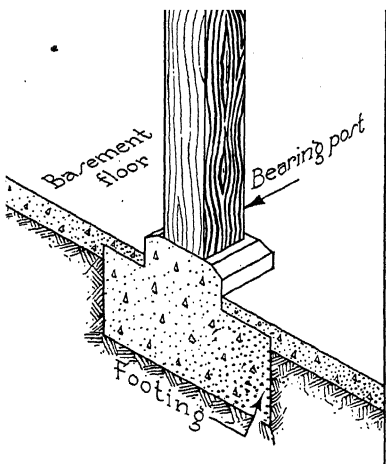
A well-built frame house needs a sound foundation, a stiff, strong frame of seasoned wood, and a weather-tight roof. Every new house will settle to some extent and the best one can do is to take precautions in building the foundation so that there will be as little settling as possible and so that it will be uniform throughout the structure. The quality of the subsoil on which the foundation rests affects the amount of settling. Wet sand allows the greatest amount of settling, and solid rock the least. Moist clay makes a satisfactory base, but if it dries out during a period of drought, it will shrink and cause settling. Where too much moisture is present, special drainage tiles must be provided to carry it away from the foundations. Unless one is very sure of the character of the subsoil, it is wise to keep a few hundred dollars in reserve to take care of special needs that may arise after excavation. Poured concrete is considered the best material for foundations, although brick, stone, concrete blocks, and hollow tile are also used. The foundation wall rests upon a concrete base, about 12 inches wider than the wall itself, called the footing. The foot-



RIGHT



WRONG



WRONG

FIG. 127.—Foundations and footings. (Courtesy of U. S. Bureau of Standards.)

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ings should be flat on the bottom, as shown in Fig. 127, to prevent settling.

The amount of moisture in the subsoil and the local drainage conditions determine the amount of waterproofing necessary for a dry basement. Drain tile laid under the basement floor and around the outside of the footings, special waterproofing compounds mixed into the concrete, a mopping of hot tar or a layer of tarred felt on the outside of the walls, are some of the means used to keep out water.

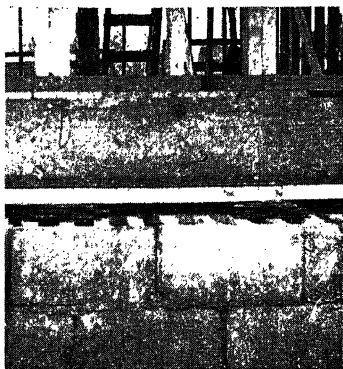


FIG. 128A.—Careless work in laying foundation. The top is not level, and will not give proper support to the frame. (Courtesy of Alexander Houses, Inc.)

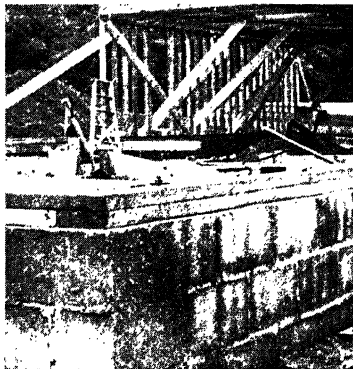


FIG. 128B.—The right way. The top of the foundation is level, forming a solid bearing for walls, and preventing air leaks. (Courtesy of Alexander Houses, Inc.)

The increased use of the basement for recreation rooms and other purposes calls for extra precautions to insure dryness.

There are three general types of wood house construction: balloon, braced, and platform framing (see Figs. 129, 130, and 131). While every carpenter has his own way of working out details, the stiffness and strength of a frame depend on adequate lumber sizes, proper bracing, and the use of enough nails. Since wood shrinks much more across the grain than lengthwise, the minimum amount of horizontal lumber should be used, and it should be placed in equal amounts in all walls, so that shrinkage will be even.

The strength of the frame as a whole is increased by the use of diagonal sheathing and diagonal subflooring. Subflooring should run

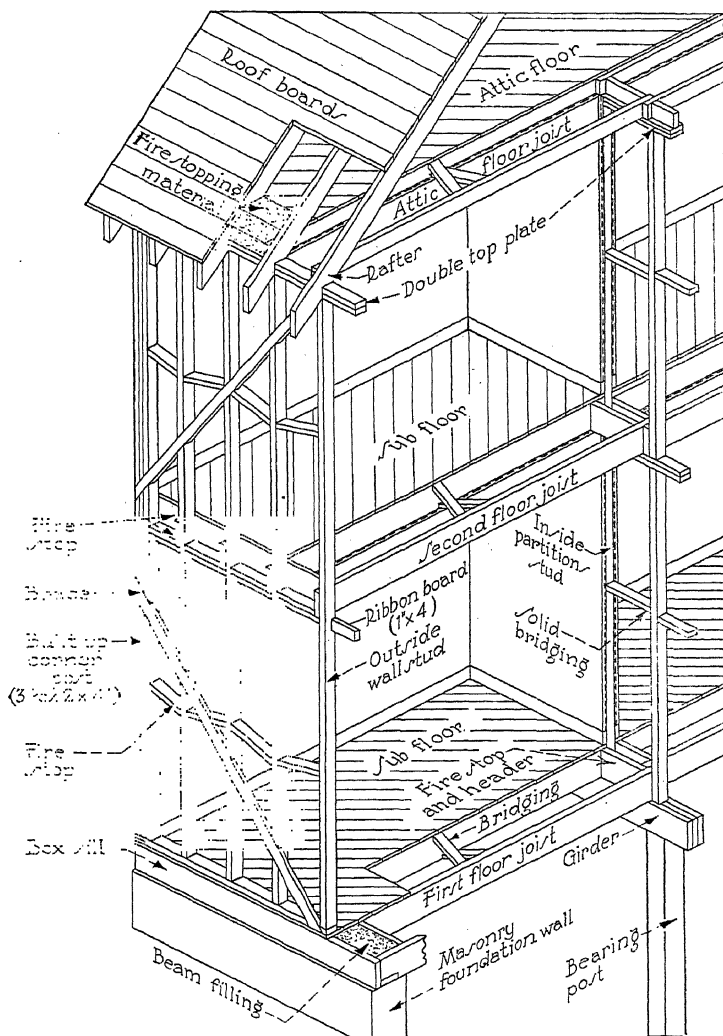


FIG. 129.—Approved details of balloon frame construction. (Courtesy of U. S. Bureau of Standards.)

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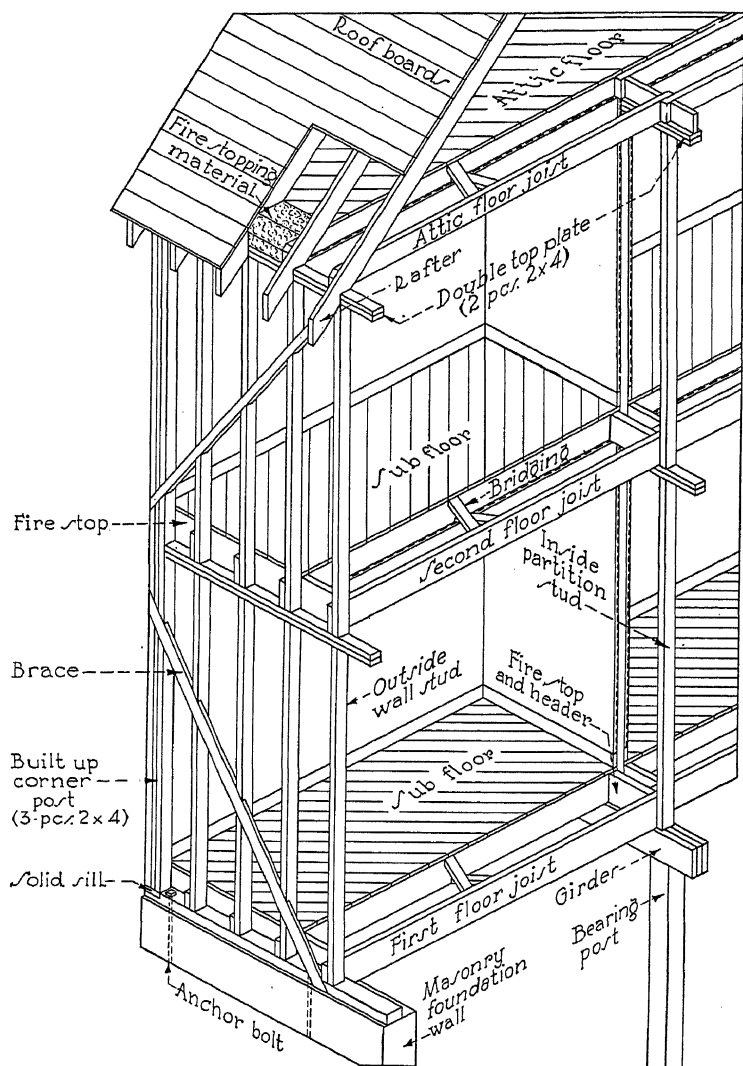


FIG. 130.—Approved details of braced frame construction. (Courtesy of U. S. Bureau of Standards.)

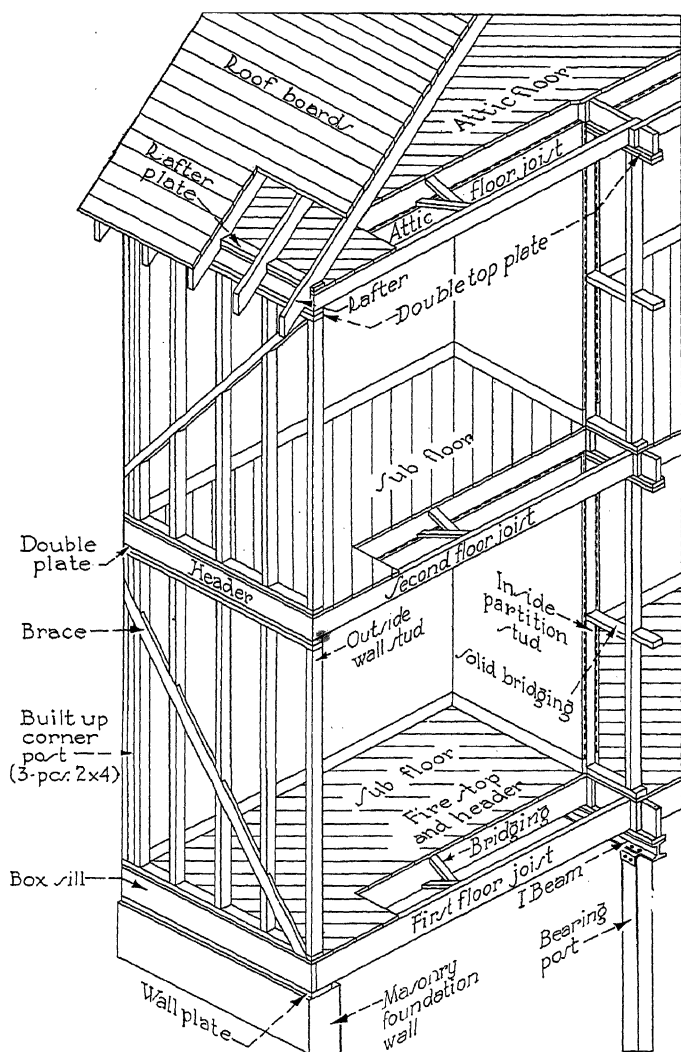


FIG. 131.—The above illustration shows details of the platform-frame type of construction, in which each story is built as a separate unit. Note settlement is equalized by making the height of horizontal timbers the same in exterior walls and interior partitions. (Courtesy of U. S. Bureau of Standards.)

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in opposite directions on first and second floors, and sheathing in opposite directions on adjoining walls. If horizontal sheathing is used for the sake of economy, diagonal braces let into the face of the studs should be used to stiffen the wall.

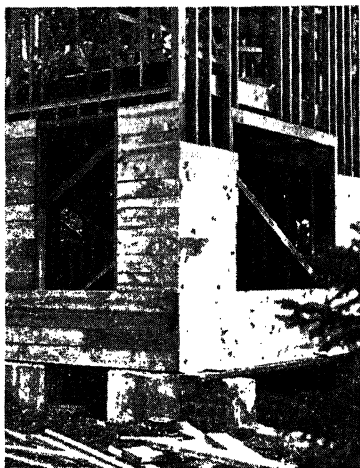


FIG. 132A.—The cheaper method. Horizontal sheathing allows vibration in high winds. (Courtesy of Alexander Houses, Inc.)

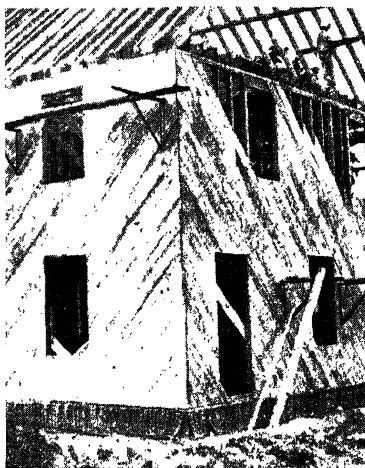


FIG. 132B.—The better method. Diagonal sheathing stiffens the frame. (Courtesy of Alexander Houses, Inc.)

Adequate joist sizes are the best insurance against sagging, squeaking floors. The stiffness of a joist depends chiefly on its height and on the quality of the lumber, and to a small degree on the width and the species of the lumber. The safe span for various sizes, species, and grades of joists has been determined.¹ Cross bridging, the line of x-shaped pieces nailed between joists, is useful in maintaining the stiffness of the floor by distributing a load over several joists. To be effective, bridging should be tightly fitted and securely nailed.

It is usually necessary to cut into the frame of the house to install plumbing pipes and heating ducts. A careless plumber may weaken the frame seriously. If the contract specifies that all such cutting be done by the carpenter and properly patched, the original

¹ Recommended Minimum Requirements for Small Dwelling Construction. *Building and Housing Publication 18*. Bureau of Standards, U.S. Department of Commerce. p. 48.

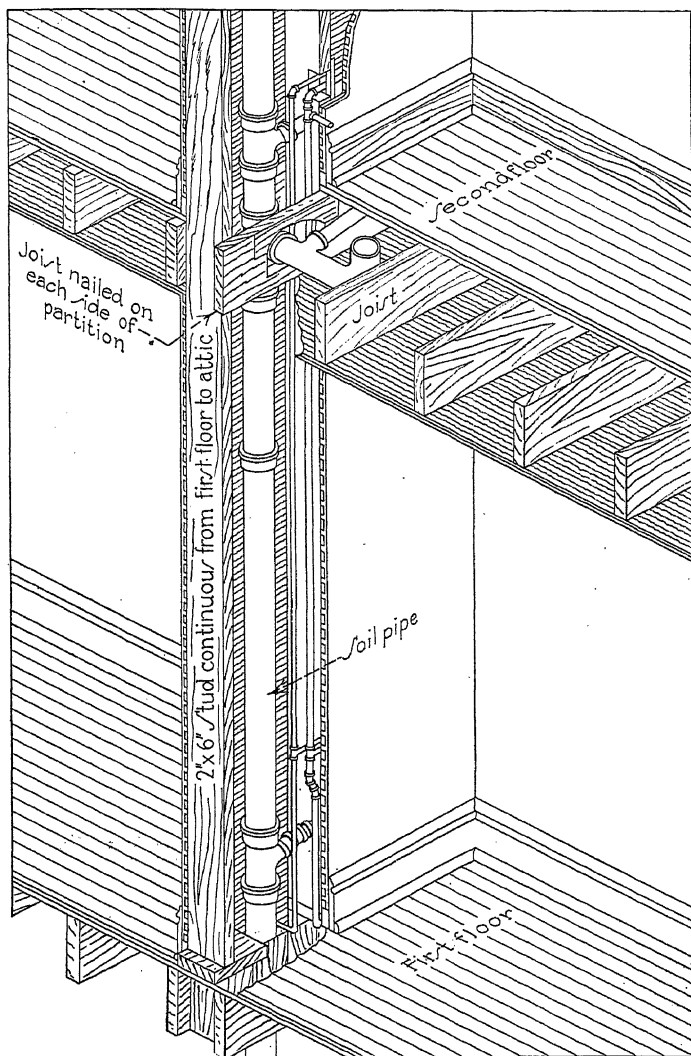


FIG. 133.—Two by six-inch partition studs accommodate vertical pipes readily and without undue loss of supporting capacity, when notched. Horizontal pipes should be run through the centers of joists, to avoid weakening them and to leave a good nailing surface for the floor. (Courtesy of U. S. Bureau of Standards.)

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strength of the frame may be regained (see Fig. 133). Sometimes it is necessary to use double joists under the bathroom, to support a tile floor and the heavy fixtures.

The cost of protection against termites is very small compared to the amount that may have to be spent repairing the damage they cause. All wood, of course, should be kept away from contact with



FIG. 134A.—Wrong. The rafter has been cut to make way for the stack. The weakened roof may sag and leak. (Courtesy of Alexander Houses, Inc.)



FIG. 134B.—Right. The stack is neatly offset to avoid the rafter, and passes through the roof without damaging the structure. (Courtesy of Alexander Houses, Inc.)

the ground; masonry foundations should be free from cracks through which the termites might enter. A metal termite shield between the foundation and the framing, extending out a few inches beyond the wall and bent downward at an angle, keeps these insects from reaching the wood by means of tunnels built on the face of the foundation. Lumber that has been treated to repel termites may be used for the sill. Poison put into the ground next to the foundation is effective, also.

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In a comparatively short time, insulation has so proved its value as a conserver of heat in winter that it is now regarded as a necessity in housebuilding. Insulation is available in a variety of forms. Most

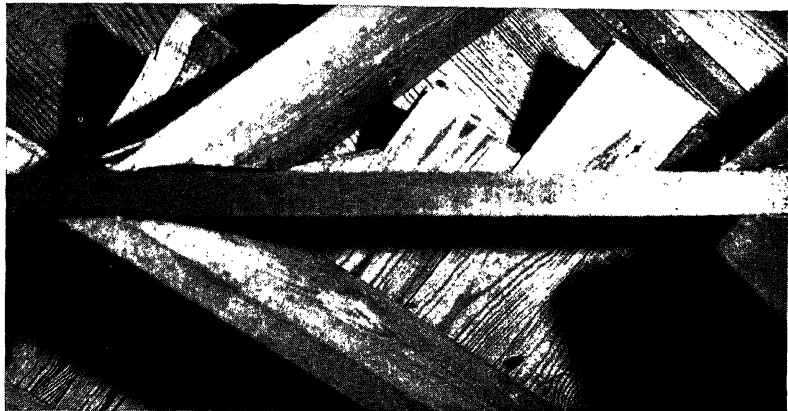


FIG. 135A.—A weak roof. Rafters do not fit tightly against ridge board. Nails alone cannot resist shrinking and settling. (*Courtesy of Alexander Houses, Inc.*)

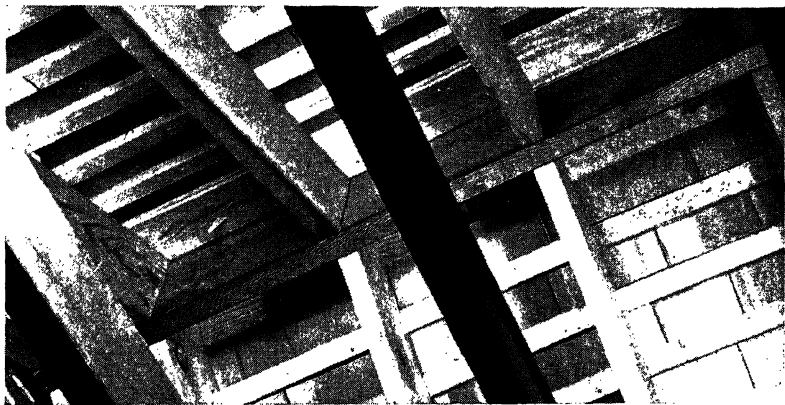


FIG. 135B.—A strong roof. Where rafters and other members are accurately fitted together, a solid bearing of wood to wood is obtained. (*Courtesy of Alexander Houses, Inc.*)

of them retard the flow of conducted heat through the walls by their loose, spongy texture, which holds a large number of dead air cells. Metal-foil insulation serves by reflecting radiant heat waves. Insulation of the first type may be had in flexible, rigid, or loose-fill forms.

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A commonly used flexible type of insulation provides a layer of wood fiber between two layers of tough, waterproof paper. It is made in the proper size to fit snugly between studs and rafters. Rock-wool bats are also made to fit between studs.

Rigid insulation is available in pieces of various sizes and is made from sugar-cane or cornstalk fibers, wood pulp, or cork. It may be applied to the inside of the studding, to serve as a plaster base or even as the finished wall. Some forms may be substituted for sheathing on the outside face of the wall, but since wood has considerable insulating value itself, a single layer of insulation does not take the place of sheathing and insulation.

Fill insulation, made of loose, spongy particles of wood or cane fiber, or of mineral wool, is used chiefly to provide insulation in an old house. It may be blown into wall spaces or poured by hand into spaces between ceiling joists, if the attic floor is unfinished.

To be permanently effective, insulation must remain in its original form. If metal foil tarnishes, it cannot reflect radiant heat waves. If the loose-fill type settles down into a dense mass after a few years, it will lose its heat-retarding qualities and leave an open air space in the top of the wall. The value of any insulation is reduced if it absorbs moisture; and if enough moisture is held, stains may come through on the walls and ceilings. According to recent studies, moisture thrown into the air of the house by the humidifier in the heating system should be kept from entering the insulation, by means of a vapor barrier on the warm side of the wall.¹

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TRADE ASSOCIATIONS SUPPLYING INFORMATION ON BUILDING MATERIALS

- Brick Manufacturers' Association of America. Washington, D. C.
- California Redwood Association. San Francisco, Calif.
- National Lumber Manufacturers' Association. Washington, D. C.
- Northwest Lumbermen's Association. Minneapolis, Minn.
- Portland Cement Association. Chicago, Ill.
- Southern Pine Association. New Orleans, La.
- Structural Clay Products Institute. Washington, D. C.
- Weyerhaeuser Sales Company. St. Paul, Minn.

Finishing Materials

THE outer walls of a wood house are covered first with sheathing, either rough boards or rigid sheet insulation. A layer of building paper is then applied, to keep out the wind. The outer covering may be wood siding or shingles, stucco, or brick veneer. Wood siding in a narrow width is generally the cheapest in first cost, but since it needs to be painted every few years, its maintenance cost is high. Stucco is a mixture of Portland cement, lime, and sand. Properly applied on metal lath, it forms a smooth, stonelike surface, popular especially in mild climates. Severe winters are hard on stucco. Since it is subject to cracking with any changes in the frame caused by wind pressure or settling, special precautions are necessary in the building of the foundations and walls. Balloon framing is recommended for stucco houses, for it contains less horizontal lumber than do the other forms of framing, and therefore it shrinks less.

For the same reason, balloon framing is recommended for brick-veneer houses. They are built in the usual manner, with sheathing and building paper over the studding. A single layer of brick is then built around the outside, with an air space of about 1 inch between brick and framing. Wall ties, little L-shaped pieces of noncorroding

metal, are bedded in the mortar at intervals and nailed to the sheathing. Brick veneering is simply a covering and does not serve to support the weight of the house.

There is a wide choice of roofing materials. For a sloping roof, wood shingles, left to weather, make a covering of a delightful blackish-brown color. The best woods for shingles are cedars, cypress, and redwood, and the first quality is described as heartwood only, edge-grain, and clear stock. The second grade in redwood is all-heart but not edge-grain.¹

A small amount of metal is used, even in a frame house. Although it plays an inconspicuous part in the appearance of the finished house, the importance of durable metal for flashing, rain gutters, and nails should not be overlooked.

The crack between chimney and roof is made watertight by means of metal strips called flashing; they are laid in the mortar joints at the upper end, and then bent down and out under the roofing. Similar flashing is used around the edges of dormers and porches, and in valleys formed by gables.

Copper is the most durable, as well as the most expensive, metal used for flashing. Lead is sometimes used; but probably the commonest flashing is galvanized iron.

The service given by the exterior coverings of a house depends on the durability of the nails used to fasten them. Hot-dipped galvanized nails are best for roofing and siding, for they are rust-resisting and their rough surfaces hold better than do those of smooth wire nails. The difference in cost between the best and the cheapest quality of nails for an entire house is negligible.

The chief objection to a wood roof is that it will burn. Composition roofings of asbestos shingles or asphalt strips are not a fire hazard. For masonry houses, slate and shingle tile are suitable, but quite costly. A lightweight sheet copper is one of the newer roofing materials, and even a fireproof thatch is on the market.

¹Selection of Lumber for Farm and Home Building. *Farmers' Bulletin* 1756. U. S. Department of Agriculture. Washington, D. C.

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For a flat roof, a built-up covering of layers of tarred felt mopped with tar and covered with gravel is laid over wood sheathing or concrete. If a flat roof is to be used as a deck, it must have special treatment so that it may be walked on. Deck roofs are generally made by stretching a layer of roofing canvas in a bed of white lead, and then painting it with lead, followed by a coat of deck paint. It must be painted often enough to keep its surface unbroken and watertight.

The usual interior finish for walls is plaster, although in late years various forms of plaster substitutes in the form of wallboards made of plywood, wood fiber, or gypsum plaster have been placed on the market. Some of them are finished with a thin wood veneer. Wallboard must be applied with special precautions, to prevent buckling. If the board is thinner than the standard plaster wall, attention must be given to the installation of switch plates and wall plugs. The chief aesthetic drawback to the use of wallboards has been the seams between the sections; lately, however, a technique for making an invisible seam has been developed. Interest in early colonial furnishing has led to a wide use of pine sheathing in place of plaster. It is interesting to note that in the old days knots were considered a blemish and were excluded from the best rooms.

Old-fashioned wood lath is being replaced by various forms of nonrusting metal or wire lath, and by insulating wallboards. Metal lath is somewhat more costly than wood, but it makes a more rigid plaster base and lessens fire hazard.

The appearance of the interior is dependent on a good plastering job. Skillful and conscientious plasterers are scarce. If the owner knows of such a man, he might do well to let the plastering contract separately from the general contract. Three coats of plaster are needed if wall-paper is to be used; the first or scratch coat, the second or straightening coat, and the finish coat of smooth plaster. The third coat is omitted sometimes for the sake of economy, and the second coat is finished with a slightly textured sand surface. If the final painting or papering is to be postponed for a time, the raw look of new plaster may be avoided at a moderate cost by mixing color into the last coat.

FINISHING MATERIALS

Light colors on walls and ceiling are desirable, for they help the artificial lighting of the room and usually contribute to a feeling of cheerfulness. In late years, fashionable decorators have shown considerable interest in dark colors for walls, and even for ceilings. It is well to remember that every room, if it is not to look like a dungeon, needs some light areas. If the walls are dark, something else must be



FIG. 136.—Dark walls are relieved by light areas in ceiling, woodwork, and furniture.

light. In Fig. 136 the dark walls are relieved by light values in ceiling, woodwork, and furniture.

In all but very low-cost houses it is customary to use two layers of flooring—the subfloor of rough boards in the case of a wood house (or of concrete, in fireproof construction) and on top a layer of finish flooring. While hardwood is the standard finish flooring for houses of average cost, a number of other materials are available. The strongest rival of wood is linoleum, which has outgrown its initial use in

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kitchen and bath to invade the entire house. It is made in a variety of colors and patterns and is soft underfoot. A good grade of linoleum is not cheap but, properly cared for, it lasts a long time. Rubber flooring is also on the market, but is injured by grease or oil, and, therefore, is not recommended for kitchens. Cork tile, often seen in library reading rooms, makes a quiet, resilient surface. Manufacturers of these modern floorings provide specific directions for installing their respective products, or even send out trained men to lay the covering. If the subfloor is concrete and the top layer is of hardwood, linoleum, or carpet, it may be cemented directly to the floor with a layer of mastic. Hardwood may also be nailed to wood strips which have been set into the surface of the concrete. In warm climates, the cold surface of clay tile or brick is not objectionable. Since a hard surface is tiring to stand on, tile, brick, and cement are not used in kitchens.

Wall-to-wall carpeting is increasingly popular, although in a good quality it is expensive. If it is installed while the house is being built, it may be laid directly on the subfloor, saving the cost of a hardwood finish flooring. It is durable if laid over a felt pad, and special techniques for cleaning it without taking it up have been developed.

Hardwood flooring may be had in a variety of grades, widths, and thicknesses, according to the amount of money one has to spend. Oak and maple are the principal hardwoods laid for finish flooring, but birch and beech are used, as well. Quartersawed oak is considered better than flat-sawed for flooring.

Flat-sawed softwood is cheaper than hardwood, but is not recommended for finish flooring, because it wears badly and splinters, unless it is kept covered by a heavy layer of varnish or paint. It is sometimes used in bedrooms where the floor receives little wear. There is small advantage in using edge-grain softwood, for it costs as much as medium-grade oak flooring and is less durable. In houses of moderate cost it is not necessary to have the very best quality of wood for flooring; the second or even third quality will do, especially when the greater part of the floor is to be covered by rugs. The cheaper

grades of flooring come in short pieces and need to be darkened to avoid a patchy look. Even in the better grades, some strips are naturally darker or lighter and, if they are laid just as they come out of the bundle, streaks of light and dark will show in the floor. To obtain a uniform tone, for the principal rooms at least, specifications should require that dark and light strips be sorted out and used in separate rooms. In the best work, short lengths should be used only to finish a row, or in closets.

After the floor has been laid, the surface is smoothed by scraping or sanding. The appearance of the finished floor depends to a great extent on the proper sanding. Careless work may not show until after the finish has been put on. The specifications should state the grades of sandpaper to be used, with a fine grade specified for finishing. The sander must also be cautioned against damaging the woodwork either by bumping into the baseboard or dragging heavy power lines across the window sills.

A freshly sanded floor has a very delicate surface. It should be protected from dirt and moisture and should not be walked on. The protecting finish should be applied as quickly as possible. For the coarse grain of oak, a paste filler is first rubbed into the pores of the wood. After it is dry, it is either varnished or shellacked, then finally waxed. Varnish makes a more durable coating than shellac, but it dries more slowly and is harder to remove or to patch when scratched or worn. Wax is used to protect the finish and to give a soft-looking polished surface. Wax is sometimes applied directly to the wood, without the use of varnish or shellac. It is a satisfactory finish with light wear and constant renewal.

Both varnish and shellac bring out a yellow tone in wood that increases with age. A yellow floor is a handicap in furnishing the room, for it interferes with most color schemes. A soft grayish-brown tone, on the other hand, makes a quiet, inconspicuous background for rugs and harmonizes with practically any color scheme. Oak floors may be given a pleasant tone by mixing lampblack and a bit of raw sienna into the filler. This method of coloring a floor is much easier

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than brushing stain into the raw wood. Varnish stains, a mixture of varnish and coloring, are looked upon with contempt by veteran painters, as being fit only for amateur use. Floor wax may be darkened



FIG. 137.—An example of interior millwork. A mantel designed by Dwight James Baum. (Courtesy of Curtis Companies, Inc.)

by melting it over hot water and stirring in a pinch of lampblack. Maple and birch are so close-grained that no filler need be used; common wood stains do not penetrate their dense texture. Special stains should be used with these woods.

The millwork of a house consists of the staircase, the doors and windows with their frames and trim, kitchen cabinets, and other built-in furniture. Millwork is usually ordered, ready made, from a



FIG. 138.—An exterior doorway designed by Dwight James Baum. (Courtesy of Curtis Companies, Inc.)

planing mill, for it can be cut and fitted more exactly and more economically by machinery than by hand. The owner has a choice of a number of stock patterns of trim—cabinets, entrance doors, cornices and other features. Figures 137 and 138 show examples of modern millwork. Special designs drawn by the architect may be made to order, but

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naturally these cost considerably more than the stock designs. High lumber costs have resulted in the use of narrow trim, in comparison with that of 50 years ago. In houses of modern design, the traditional door and window trim is often omitted.

The first grade of select lumber is generally used for millwork, although a few small knots are not objectionable if the wood is to be painted. The kind of wood is chosen mainly according to whether the finish is to be natural or painted. The main factor in choosing between natural and painted woodwork is the amount of emphasis the owner wishes to give it. Natural finish is much more conspicuous than the painted, because of the pattern of the grain, the color of the wood—which may be anything from a grayed orange-yellow to a dark brown—and value contrast, for even light-finished woods are considerably darker than average walls. If patterned fabrics are to be used in curtains, rugs, or furniture, the pattern of the grain in doors and trim may be just enough extra pattern to produce confusion. Unless the entire color scheme of the room is to be based on wood tones, the yellows and browns of the woodwork may be a jarring note. The value contrast between light walls and dark woodwork cuts up the wall space and makes a room seem smaller. On the other hand, a serene, unbroken background may be most easily obtained by painting the woodwork the same color as the walls, or a bit lighter.

Some of the modern wood finishes do away with the two most objectionable features of natural-finished woodwork—the strong color and the dark values. The blond finish so popular in modern furniture may be applied to woodwork, especially to woods that are naturally light, such as maple and birch. Darker woods, such as oak, may be given a silver-gray tone by the use of acid stains, or by rubbing white lead into the grain.

Both millwork and finish flooring should be stored in a dry place until it is time to install them. They should not even be brought into the house until after the plaster has dried. In quality work it is customary to give the back surfaces of millwork a coat of paint, to keep them from absorbing moisture from the walls.

The durability of wood depends on the protective coating of paint applied over it. Since labor costs, which take up the greater part of the cost of painting, are the same whether one uses poor or good paint, it is false economy to save a few dollars on the quality of paint. Good paint is not cheap, but it will save much more than the initial difference in cost by its longer life. The reputation of the manufacturer and the cost of paint are fair guides to quality.

The composition of paint is varied according to its uses. For instance, outside paint is made to stand the weather and floor paint to stand wear. The washable qualities of paint for walls and woodwork should be investigated before buying. Enamel, which is a mixture of paint and varnish, is easily washed, but its high gloss may be too glaring for a quiet background. Semigloss and eggshell enamels are a bit less easy to keep clean than the high-gloss enamel, but their surface is more pleasing to the eye.

If paint is put on damp wood it will soon crack and peel off. Nor should it be applied when there is danger of frost before it dries.

Calsomine is an inexpensive water-color paint often used on walls. It is neither waterproof nor washable. Casein paint, a fairly modern development, is mixed with water to apply, but becomes waterproof on drying. For the whitewashed brick walls that are popular for a variety of styles, special waterproofing cement paints are available.

While the choice of color for the exterior of a house is largely dependent on personal preference, a safe rule to follow is that the color of the house should fit the surrounding trees and shrubbery, as well as the neighboring houses. No matter how beautiful a color may be in itself, if it quarrels violently with the colors next to it the result will be unpleasant. Generally speaking, the chief color about a house is the soft green of trees and foundation planting. Fortunately, there are many colors that are pleasant with leaf green. The gray of stone, white and light colors of painted wood, and the soft reddish tones of bricks are all harmonious. Bright green and bright red are the most difficult colors to use. A strong-green roof, for instance, kills the grayer

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green of the foliage around it; a bright-red one stands out in harsh contrast.

Color has three general qualities: hue, or kind of color; value, or light and dark; and intensity, or brightness as opposed to grayness. The color circle represented in Fig. 139 is based upon the results one

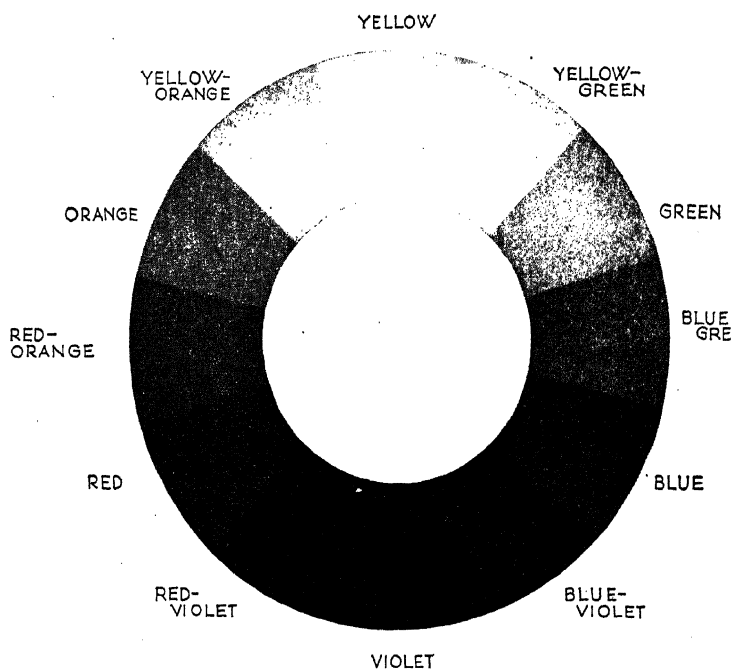


FIG. 139.—A circle showing the relative values of the principal colors.

obtains by mixing paint, rather than upon any scientific theory of light. Red, blue, and yellow are considered the primary colors, for all the others can be made by mixing them in varying proportions. Orange, green, and violet are usually called secondary colors, for each of them represents an equal mixture of the two primaries on either side of it. The remaining colors shown on the circle, those with hyphenated names, represent an unequal mixing of two primaries.

Yellow-green, for instance, contains more yellow than blue, while blue-green contains a greater amount of blue than yellow.

Any color of full intensity, that is, as strong and pure as one can imagine it, may be considered a standard, against which variations in value or intensity may be measured. Each hue has its certain definite value—yellow, for instance, is the lightest color, and violet the darkest. Between these extremes, on each side of the circle, the colors step down in value according to their position, each one being a little darker than the one above it. Blue-green, for instance, is naturally darker than green, which in turn is darker than yellow-green. The varying tones of gray in Fig. 139 represent the relative values of the standard hues.

The value of any hue may be altered by adding white, to lighten it, or black, to darken it. The intensity or brightness of any color may be reduced by adding either its complement (the color opposite on the circle) or gray. Incidentally, making a color either lighter or darker also reduces its intensity. Pink (light red) and maroon (dark red) are both less bright than the standard red. Reducing the intensity of a color usually alters its value, also. Colors may be grouped into families according to their intensity and value. The clear bright standard colors of the circle form one group, the darker values (standard plus black, called shades) another, light values (standard plus white, called tints) still another, and finally the grayed colors (standard plus gray). Of course there are innumerable gradations between these groups, and there is still another group, of neutrals such as black, white, gray, tan, and dull brown.

It is not possible to lay down any mechanical rules for color combinations. The areas and textures used and the amount of light are all factors in creating a pleasing color scheme. In general, the fundamental purpose in combining colors is to bring out the full beauty of each color. No color is ugly in itself; if it appears unpleasant, it is simply in the wrong surroundings. Here are two suggestions that may help in combining colors: First, colors seem to get along better if they are about equal in intensity. A bright color "kills" a grayed

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color, making it appear drab and dingy by contrast. Second, colors seem to form more pleasing combination if their relative values follow those of the standard color circle. That is, if blue and green are used together, the result will be better if the blue is a bit darker than the green.

The two suggestions as to the use of value and intensity may be applied to color combinations for houses. For instance, if blue-green roof and yellow-green shutters are to be used on a white colonial house, the blue-green should be darker than the yellow-green, because it is naturally a darker color. A combination of olive green (dark yellow-green) and turquoise (light blue-green) is unpleasant, because the natural value relationship of the two colors has not been followed. For the same reason, a house of light purplish-red bricks with a darker orange-red tile roof is not successful, because the relative values of the two colors have been reversed. Orange-red is naturally lighter than violet-red, since it is closer to yellow, and higher on the circle. If, however, darker purplish-red bricks and a lighter orange-red tile are used, the result will be acceptable to the eye. The two colors used in either of these combinations should be approximately the same intensity; they may both be very bright, or they may be very lightly grayed, or they may be very much grayed, almost neutral. If, however, a bright blue-green roof is used with dull yellow-green shutters, neither color will appear to best advantage.

When a color scheme is chosen for a house, the larger areas of wall and roof should be decided upon first, and details such as trim, shutters, and doors, later. The arrangement of light and dark, apart from color, is most important. On a small house it is wise not to use a sharp contrast in value between wall and trim, such as white walls and dark green trim, or brown-stained walls and pure white trim. Such a contrast makes the house appear even smaller, and it emphasizes any irregularities in the size and placing of windows and doors. Usually, white or very light trim is used on the more formal styles, such as the Georgian and Greek revival, and dark trim on the cottage styles of England and Northern France.

FINISHING MATERIALS

Since the beginning of the century, a decided change has come about in brick fashions. When one finds an old brick house and a new one standing side by side, the contrast is brought out sharply. The old house will have walls of red brick, smooth of surface and perfectly uniform in color. The new one may have rough-surfaced bricks of



FIG. 140.—Pine-paneled walls are used in this study. (V. C. Salomonsky, architect; photograph by Paul J. Weber.)

three or more colors: a red-brown, a green-brown, and a dull mustard yellow, for instance. These different colors will be scrambled together in a random pattern, and the yellow bricks stand out like pale freckles in a dark face.

Here we have the two extremes of style in brickwork. In the late nineteenth and early twentieth centuries perfect uniformity of color and texture was considered desirable. Bricks were made as smooth as possible and were sorted according to color. There is a natural varia-

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tion of color in bricks according to their position in the kiln; those nearest the fire come out darkest, those placed farthest away are lightest. A wall built of smooth, perfectly matched bricks is monotonous and uninteresting. Someone must have discovered that a rather rough texture and slight variations of color produce more character and interest in a wall. At present, the pendulum of popular taste has swung too far; with our characteristic American tendency to overwork a good idea we have gone to all sorts of extremes to produce variety of texture and color. The surface of bricks is roughened beyond all reason, and violent contrasts of color are used.

In the matter of texture and color, however, moderation means everything. If the play of color in a brick wall is so slight that one scarcely notices it, the effect is delightful. All the bricks in the same wall should look as if they were related—if not sisters and brothers, at least first cousins. Red, gray, brown, and yellow bricks, however, are not even distantly related. When they are used together they destroy the unity of the wall and distract attention from more important qualities in the design of the house.

Light mortar is considered better than dark, because it brings out the charming patterns of the brickwork and adds a feeling of cheerfulness. Dark mortar hides the pattern of the brickwork and may produce a dark, gloomy wall.

The trim used on a brick house depends upon the style of the house and the dominant color of the bricks. A neat Georgian colonial house of rosy-red bricks may have trim of white, ivory, or a light tan. An English cottage may be finished with brown-stained door and window sashes; or if one wishes to create a lighter effect, the trim may be painted tan of any light tint, provided that it is somewhat grayed. A clear color on the trim will kill the grayer color of the brick.

Of white houses, Lewis Mumford says:

"Indeed, the whiteness of our colonial architecture is an essential characteristic; it dazzled Dickens on his first visit to America, and made him think that all the houses had been built only yesterday. The aesthetic reason for delighting in these white colonial farmhouses is

single: White and white alone fully reflects the surrounding lights; white and white alone gives a pure blue or lavender shadow against the sunlight. At dawn, a white house is pale pink and turquoise; at high noon, it is clear yellow and lavender-blue; in a ripe sunset, it is orange and purple; in short, except on a gray day, it is anything but white. These old white houses, if they seem a little sudden and sharp in the landscape, are at least part of the sky; One finds them stretched on a slight rise above the highroad like a seagull with poised wings, or a cloud above the tree-tops."¹

¹ MUMFORD, LEWIS. *Sticks and Stones*. Liveright Publishing Corporation. New York. 1924.

Heating

THE present high cost of building is not entirely a matter of increased material and labor costs. Modern standards of comfort and convenience are responsible for much of the increase. A few generations ago, a house provided little besides shelter, with primitive and inadequate provisions for heating it in winter. The present-day owner demands much more of his house than mere shelter. It must contain within its framework a network of electrical wiring, hot- and cold-water pipes, and an elaborate heating system. These accessories to shelter make up about 20 per cent of the total cost of the house. Building would be much less expensive if we could be content with kerosene lamps, base burners, and a bucket to bring in water from a well.

The question is not, however, whether or not we shall do without modern conveniences; it is, rather, how many of them may be crowded into even the smallest budget. No one who could possibly afford them would consider building a house without modern plumbing, heating, and lighting systems. In many cases they are achieved by reducing the size and number of rooms. The modern house is becoming more complicated every year. Additional bathrooms, greater refinements of the heating system, and increased use of electrical equipment all point the way toward higher cost, as well as more comfortable living.

Except in the mildest climate, some means of providing artificial heat must be considered an essential part of shelter. The development of modern heating is of very recent date; as late as 1800 stoves were a novelty, and central heating has become a commonplace only since the turn of the century. For hundreds of years, mankind had to get along with fireplaces for heating as well as cooking. Before the invention of the chimney, fires were built in the middle of the floor, and the smoke drifted about the room, escaping finally through louvers in the roof.

Developments in the field of heating and air conditioning are proceeding so rapidly today that one can only guess at the future. The prospective homeowner must keep in touch with current practice through magazines and literature supplied by leading manufacturers of heating equipment. The design and installation of a heating plant, however, are far too technical for the layman. He should give them into the hands of a competent heating engineer.

The problem of heating is stated as follows:

"To maintain the rooms of a building at a comfortable temperature, it is necessary to supply continuously a definite amount of heat to each room, equal to the amount being dissipated from the room. It is the function of the modern heating system, taken as a whole, to extract heat from the fuel by combustion and to deliver it to the rooms in the required amounts. In the warm-air, steam, and hot-water systems, the air, steam, or water should be thought of as the vehicle by which the heat is conveyed to its points of use."¹

The type of heating system chosen for any house depends on the climate, the size and shape of the house, and the comparative local cost of fuels. In the semitropical parts of the country, where a bit of heat is needed mornings and evenings, to "take the chill off" the house, the cost of fuel is of relatively little importance. Various types of room heaters, using expensive fuel, such as gas or electricity, have been developed for use in mild climates. In the Northern states, how-

¹ ALLEN, J. R., and J. H. WALKER. *Heating and Air Conditioning*. McGraw-Hill Book Company, Inc. New York. 1936.

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ever, where winter lasts more than half the year, and sub-zero weather calls for continuous heavy firing, the price of fuel is an important item in living costs.

For a small, inexpensive house, a heating stove is efficient, but it heats only one room well. If the plan is arranged so that doors into other rooms are close to the stove, some heat will spread through the house. The pipeless furnace set in the basement, with one large register in the floor directly above it, is better than a stove; but, unless there are large openings between rooms, it will not heat the entire first floor. The effectiveness of a pipeless furnace may be increased by the addition of cold-air return ducts from opposite ends of the house. The pipeless furnace, however, is old-fashioned, and unsatisfactory for houses containing more than three or four rooms.

The commonest and least expensive form of central heating is the gravity warm-air system. The heated air rises from the furnace through ducts to the rooms above. Cool air is drawn off the floor at various points in the house (sometimes with the addition of air from outdoors) and returned to the furnace for heating. The introduction of outdoor air depends on the climate. Where winters are mild, practically all the cold air may be taken from outside. In the Northern states, however, the use of outdoor air is too expensive, and in common practice the cool air taken off the floor is simply recirculated. It is generally believed that in cold weather sufficient fresh air is let into a house by means of the ordinary opening of entrance doors, the opening of bedroom windows at night, and through cracks around windows and doors.

The circulation of heat depends upon the fact that warm air rises and cold air falls. The gravity warm-air system is satisfactory in small houses of compact plan and uncomplicated structure, although rooms on the windward side may be hard to heat. The furnace must be located near the center of the house, so that horizontal warm-air pipes may be as short as possible.

The most important recent development in warm-air heating is the addition of a fan to force the air through the system. Various

improvements are made possible by the fan: the air may be forced through a filter to remove dust, large houses and houses of rambling plan may be uniformly heated, and the furnace need not be in the center of the basement—in fact, it need not be in the basement at all, but may be installed in a small room on the first floor. The forced-air system may be readily adapted to summer air cooling. The additional cost of fan and filter is not out of proportion in houses costing between \$5,000 and \$10,000. It is claimed that forced-air heating makes for greater economy in fuel consumption.

The first cost of steam and hot-water heating systems is about 25 per cent more than that of a warm-air gravity system. The operating costs of air, water, and steam are approximately the same. From an aesthetic viewpoint, the homely radiators of the old-fashioned steam and hot-water systems form their chief disadvantage. It is possible, now, to install the radiator in the wall, with inoffensive grills for the circulation of heat. The expense of such installations is not prohibitive. Popular interest in air conditioning and humidifying has led to the development of combinations of radiators and air-circulation ducts.

The need for supplying moisture to the air in a house during periods of heavy firing is obvious to anyone who has had to breathe the hot, dry air provided by old-fashioned heating systems. A relative humidity of 40 per cent is considered desirable for comfort and health, but this causes undesirable condensation on windows. Water pans for evaporating moisture are set on steam or hot-water radiators, but they are not efficient, and no one would call them handsome. In the case of the warm-air system, the evaporation of moisture takes place in the furnace and offers no problem to the interior decorator. The water pan of the older type of warm-air furnace, to be filled by hand (or forgotten), has been superseded by humidifiers attached to the water supply; the amount of water is automatically proportioned to the heat of the fire.

The development of automatic heating at a reasonable price offers an escape from a large part of the drudgery connected with living in a house; with gas, oil, or coal as the fuel, thermostatic control

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of combustion provides even heat with little or no attention. New types of oil burners use a cheaper oil than those of a few years ago. Coal stokers now may draw the coal directly from a specially designed bin, eliminating the labor of keeping the hopper filled, while some stokers have devices for removing ashes. Burning coal by means of a stoker is more economical than hand firing; therefore, a stoker need not be looked upon as an extravagance.

In the typical oil burner used in residences, the oil is atomized and mixed with air by being blown through a tiny jet. The mixture is ignited usually by an electric spark. The coal stoker in common use for residences consists of a retort into which the coal is fed from below by a screw which comes from a hopper or a specially shaped bin. Another tube, beside the screw, furnishes a strong blast of air, blown in by a fan. Many good stokers and oil burners are on the market. In making a choice, the quality of service given by the local dealer is an important factor. A bargain stoker or oil burner bought from someone who does not know how to take care of it is a poor investment.

Where natural gas is available, gas-fired furnaces or boilers may offer the best solution of the heating problem. Artificial gas, however, may be too expensive for use in cold climates. Oil is generally a more costly fuel than coal.

One difficulty that may be avoided by foresight on the part of the owner is the awkward placing of radiators or registers. In their zeal for efficiency, heating engineers sometimes forget that the room must also contain furniture. It is possible for chairs and tables and registers to dwell together amicably if their positions have been worked out beforehand on the blueprints. The owner who does not keep a sharp eye on the placing of the heat outlets has only himself to blame if a hot-air register appears in the center of the only space large enough for the sofa. In a question involving efficiency, the final decision should, of course, rest with the heating engineer, and the furniture must be rearranged. Such problems should be discovered and solved, however, while the house is still in the blueprint stage, by conference between owner, architect, and heating contractor.

It is perhaps illogical to place the first method of heating last in a consideration of the subject. The fireplace, for so many centuries the only means of heating, is surpassed in efficiency by all later methods, but it is in no danger of being discarded for that reason. Open fires, because of the beauty and interest they add to a room, and no doubt because of the traditional symbolism of the hearth, are still used. Only a bold and unconventional spirit has the courage to build a house without a fireplace in the living room. And, indeed, the fireplace serves a useful purpose for supplying a little heat when the weather is not cold enough to justify using the main heating system.

Even the hearth fire, however, is being harnessed by modern ingenuity and made to yield a larger percentage of heat units. Prefabricated metal fireplace linings, with ducts for circulating air above the fire, bring back into the room heat that formerly went up the chimney. Some of them even have ducts for carrying warm air to other rooms in the house.¹

Keeping the house comfortable in winter depends on more than the heating systems. Poorly constructed walls, loose windows, and a flimsy roof may allow heat to leak out almost as fast as the furnace supplies it. Insulation of roof and walls, weather-stripping of windows and doors, and storm windows, all help in preventing the loss of heat.

APPROXIMATE FUEL SAVINGS IN DWELLING HOUSES¹

Percentage of fuel required for a similar house without insulation or weather stripping

Conditions	Saving per cent
No insulation, weather-stripped	15-20
Same, with storm windows	25-30
½ same insulation, not weather-stripped	20-30
Same, weather-stripped	About 40

¹ Thermal Insulation of Buildings. Circular 376. Bureau of Standards. U. S. Department of Commerce.

Vestibules for outside doors, especially on the north side of the house, are of value in cold, windy regions. A compact, rectangular

¹ *Architectural Forum*. August, 1936, p. 40.

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house is more easily kept warm than one with a rambling, spread-out plan, for it has a smaller outside surface in relation to floor area. High ceilings require more fuel than low ones. During periods of extreme cold combined with high winds, it may be difficult to keep the entire house comfortable. At such times, enclosed stairways and doors between rooms make it possible to concentrate the heat in a part of the house. Large openings between rooms and open stairways are spacious and airy in summer, but unless the house is very well insulated and weather-stripped, they will produce a drafty house in winter.

As a result of popular interest in air conditioning, the modern heating system is now being called on for service in summer as well as winter. A true air-conditioning plant circulates at all times a supply of clean, odor-free air of the proper temperature and humidity content. In winter the air is cleaned, warmed, and humidified, and in summer it is cooled, cleaned, and dehumidified. Various air-conditioning systems have for a long time been used in public buildings when the presence of numbers of people required special provision for ventilation. In the past few years similar equipment has been developed for use in fairly small houses.

A forced-air system, with a filter and a humidifier, provides satisfactory winter air conditioning for single-family dwellings. Complete summer air conditioning calls for the addition of costly equipment for cooling the air and some provision for removing excess moisture. Year-round air conditioning is most useful in crowded sections of cities where the outdoor air is laden with smoke and dust. In the country or the suburbs, however, the tightly closed windows required for the operation of an air-conditioning plant would shut out bird songs and the fragrant winds of summer. Summer air conditioning, however, is a boon to those who suffer from hay fever.

Where the period of uncomfortable summer heat lasts only a few weeks, the extra cost of cooling and dehumidifying equipment is scarcely justified. There are simpler and less costly ways of being comfortable in hot weather. The house may be opened at night and

closed against hot daytime winds, with air circulation provided by the blower in a forced-air system, or by portable fans. A special fan may be installed in an attic window, to blow out the hot air within the house and pull in cooler night air through downstairs windows. For the price of a cooling system, one might fit up a basement room for use as a summer living room, or build on a screened porch. Awnings, on east and west windows especially, help considerably in keeping a house cool.

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Plumbing

FOREIGNERS visiting these shores are expected to be dazzled by the splendor of the American bathroom, and Americans traveling abroad are notoriously complacent on the subject. They would probably not like to be reminded that more than half the homes in the United States are without running water. A supply of clean, wholesome water and a system for disposing of waste are taken for granted by city dwellers; in the country and the small village they constitute a major problem in home building.

When a house is built where there is a community water supply and a sewage system, the owner must pay the cost of bringing in the connecting pipes from the mains in the center of the street. The cost depends upon the distance between the street and the house.

The pipe that brings water in from the main should be of ample size. If it is too small, there will be insufficient water to allow the use of two fixtures at the same time. The owner should see to it that this pipe is large enough, or at least as large as the local regulations permit.

The installation of the plumbing system calls for the services of a reliable plumber. The owner cannot watch to see that every joint is properly made; probably he would not recognize inferior work if he saw it. The best he can do is to employ a man who has a reputation for

doing good work over a period of years. Some states, and most cities, have plumbing codes. Certain standards are specified in the codes, and repeated inspections of the installation are made by the city inspector. When a house is built in the country or in a town where a plumbing code is not enforced, the owner would do well to ask advice of the city engineer of a near-by town, or of the manager of the town's water works.

In a small house of four to six rooms, the usual plumbing installation consists of a bathroom, a kitchen sink, two laundry tubs, one or two basement drains, an outside hose tap, and a water heater. A house of seven to ten rooms would probably have, in addition, a downstairs lavatory or a second bathroom, or both. The modern trend is decidedly in the direction of additional bathrooms. A few years ago, a separate bathroom for each bedroom was considered the height of luxury and extravagance; today such accommodation is not infrequent, even in houses of moderate size and cost. The home builder who wants his house to be salable 10 years later, will do well to include as many extra bathrooms as his budget will allow, or at least to provide in the plan for their installation at a later date.

The plumbing system of a house consists of two separate parts: first, the pipes which bring water into the house and distribute it to the various fixtures (with a detour for the hot-water supply through the water heater), and second, the pipes which carry waste from each fixture to the sewer main. These two parts differ in material as well as in purpose, and it is obvious that the utmost precaution should be used to prevent any connection between them.

The homeowner has a variety of metals to choose from for the plumbing installation. With regard to first cost alone, plain black steel pipe is the cheapest; galvanized steel pipe costs a bit more; other materials, increasing in first cost in the order in which they are named, are plain wrought iron, galvanized wrought iron, lead, brass, and copper.

First cost, however, is less important than durability in plumbing pipes. A cheap pipe, which has to be replaced in a few years, will

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prove more costly in the long run than a better grade of pipe. In inexpensive small houses galvanized iron is commonly used for the supply pipes, but the kind of pipe used is governed by the composition of the water. Soft water may contain chemicals that attack iron pipe; very hard water will deposit a crust on galvanized pipe that may eventually clog the pipes. In either case, brass or copper, which cost from 20 to 30 per cent more than galvanized pipe, will eventually pay for themselves. In a few localities chemicals in the water supply attack brass.

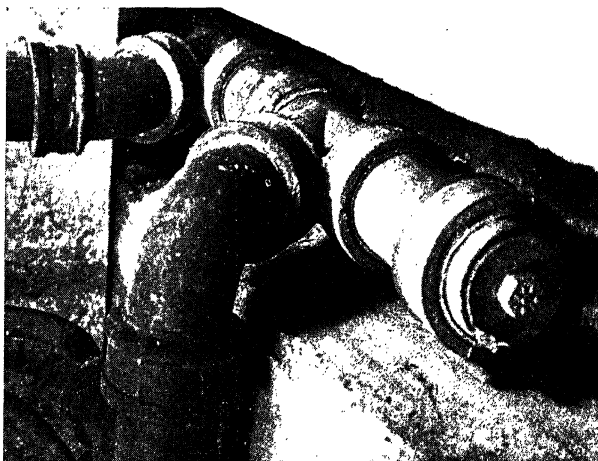


FIG. 141.—Every important bend in waste pipes should have a clean-out so that clogged pipes may be cleared without being taken apart. (Courtesy of Alexander Houses, Inc.)

The local plumbing code should be consulted before deciding on the pipe. "Black pipe," which is made of common steel, ungalvanized, is not suitable for carrying the water supply.

For the disposal of waste, a drainpipe runs from each fixture to a large central waste, called the soil pipe. The soil pipe is made of gray cast iron, and extends down beneath the basement floor, and out at least 5 feet beyond the foundation. Beyond that, the waste pipe may be of cast iron or of vitrified salt-glaze tile, with bell-and-spigot joints, calked with cement mortar, to prevent the entrance of tree

roots. This underground waste pipe leads to the city sewer, or, in the case of a country house, to a septic tank.

To prevent sewer odors from coming back into the house, each waste pipe is fitted with a trap—usually a deep U-shaped curve which holds a water seal. The drainpipes must also be ventilated, to keep the water seals from being siphoned out by waste water. The pipe that may be seen extending up through the roof of a house is the upper end of the vent pipe. The top is open in order to maintain an even air pressure in the drainage system. This pipe may be the upper end of the soil pipe, or it may be a separate pipe, as there are a number of methods of ventilating the waste system of a house.

When a pipe begins to leak, the first thing to do is to turn off the water supply. Perhaps the most important thing the housewife needs to know is the location of the shutoff valves. In older installations, one valve controlled the water supply for the entire house. Today, several valves are used for various sections of the system, so that, if the kitchen tap must be repaired, water may still be used in lavatory and bathroom.

Grouping the kitchen, laundry, and bathroom in the same corner of the house effects a small saving in the cost of plumbing. The importance of this saving, naturally, depends on the size and cost of the house. When a limited budget must be stretched to cover a great many items, a saving of \$25 to \$50 is worth working for. In a larger house, however, there is usually a small margin for extras, and the owner can afford to spend a little more money on the plumbing system, in order to obtain the room arrangement that best suits his needs. Grouping the plumbing fixtures does not make a saving large enough to justify sacrificing the plan of the house for it (see page 91). In a large house, particularly, it is difficult to arrange rooms well without separating the plumbing units.

The choice of materials and design of fixtures for kitchen and bath is left to the owner. Porcelain is the most expensive material and is seldom used in houses of moderate cost. Porcelain enamel on either cast iron or pressed steel is less expensive and entirely satis-

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factory. Colored enamel is now more expensive than white, but the difference in cost is shrinking and in a few years will probably be negligible. Fixtures of ivory or warm beige fit more easily into some color schemes than dead-white ones do.

Vitrified china is used for the water closet. The commonly used washdown, or reverse-trap type is the least expensive; the siphon-jet and flush-valve types are more costly, but quieter and more sanitary. Some provision for a shower is considered a necessity in almost every family. A shower head set above the tub is inexpensive and uses no extra floor space. If a separate shower stall is to be used on the second floor, a one-piece shower cabinet is by far the best. A built-up shower stall is likely to leak when the house settles, and the source of the leak is often hard to find.

For the kitchen sink, monel metal and stainless steel are available, but higher in price than enameled iron. As ordinary enamel is roughened and stained by fruit juice, it is worth while to pay the higher cost of acid-resistant enamel. It is important that a kitchen sink be free from cracks where dirt and grease may accumulate. When sink, drainboards, and splash back are made all in one piece, cracks are entirely eliminated. If a flat-rim sink is to be set with waterproof cement into a linoleum counter, the work should be executed and guaranteed by an expert.

Chromium plate has become the standard material for fittings, because it is durable and nontarnishing. Mixer faucets for sink, tub, and lavatory are worth their slightly higher price. For tub and wash-bowl the mouth of the faucet is placed high enough so that it cannot be immersed. The houseowner should choose the best fittings he can afford; they are subject to hard and continuous use. The cost of replacing cheap ones might be more than the first cost of good fittings.

The general tendency in the design of plumbing fixtures is toward simplicity of form, neatness, and ease of cleaning. Pipes have disappeared from view. The set-in tub has replaced the freestanding type. Lavatories with cabinets below make use of space formerly wasted. New ventures in prefabrication have produced fixtures in one piece with wall panels, and, more recently, a complete one-piece bathroom formed out of copper. The housekeeper's first thought on seeing

the last-named product will probably be that one must climb into the tub in order to clean it, for it is separated from the rest of the room by a waist-high partition.

A constant supply of hot water does more than anything else to lighten the work of housekeeping. In sections where winters are cold a water pipe attached to the heating system provides enough hot water for ordinary use during periods of steady firing. In mild weather, however, an additional source of hot water is needed. Water heaters are available in a wide price range. Generally speaking, the cheapest heaters are those which require the most care, while the most expensive are entirely automatic. Coal-fired heaters are the least expensive to install and to maintain, but they must be fired once a day at least. The cheapest gas heater must be lighted and turned off by hand every time hot water is desired. If the heater is located in the basement, it calls for endless stair climbing. The automatic gas or electric heater is equipped with a thermostat, to keep the water in the storage tank at a specified temperature. The instantaneous gas heater has a device for turning on heat whenever a hot-water tap is turned on. This is the most expensive way to heat water.

In many towns, special current rates are allowed for "off-peak" electric water heaters, which use current only during certain hours when other demands on the electric plant are at a minimum. The hot water is stored in an insulated tank. An additional attachment may provide extra hot water if the supply is exhausted before the next off-peak period begins. The size of the storage tank is determined by the size of the family. The choice of material for the storage tank depends on the composition of the water. The cheap, galvanized water tank is not permanent. The extra cost of a corrosion-proof tank is no more than the replacement cost of a cheap tank. All water tanks should be insulated, to prevent loss of heat.

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Lighting

THE electrical wiring and lighting fixtures cost from 5 to 10 per cent of the total expenditure for the house. Usually, the building contract allots a certain sum for lighting fixtures, to be chosen by the owner. If the fixtures he chooses cost more than this allowance, he must make up the difference himself.












	Ceiling Outlet		Special Purpose Outlet
	Wall Bracket		Lighting Panel
	Drop Cord		Buzzer
	Double Convenience Outlet		Push Button
	Floor Outlet		Bell
S ¹	One-way switch		Telephone
S ³	Three-way switch		

FIG. 142.—Wiring symbols.

The position of all light switches, fixtures, and outlets should be determined while the house is being planned. Figure 142 shows the conventional signs used on blueprints to indicate various types of outlet. It is more economical to have all the wiring done at once, while the house is going up, than to add switches and outlets, a few at a

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time, later on. Since it is almost impossible to foresee all the arrangements of furniture and all the uses to be made of rooms, it is safer to distribute enough outlets to take care of all probable requirements.

The use of electrical appliances has been extended rapidly in the past few years and will probably continue to grow. It is wise, therefore, to plan the wiring of a house for the future, even if one cannot buy all electrical equipment at once. The actual work of wiring should be done by a licensed electrician, according to the electrical code of the national Board of Fire Underwriters. In most towns the installation must pass inspection before it is approved. In small houses the wiring is usually of the knob-and-tube type. Wires are run inside the partitions and floors, held with porcelain knobs; where they pass through joists or studs they are protected by porcelain tubes. The size of the wires is adjusted to the load they are to carry, and the copper should be sufficiently heavy to carry an increased future load safely. Protection from overloading is provided by fuses or, more recently, by circuit breakers, which automatically turn off the current when an overload occurs. Circuit breakers are more expensive than fuses, but they are safer and more convenient.

The location of lights, outlets, and switches must be determined in relation to the use of each room. After the plan and the furniture arrangement have been decided upon, the owner should try to imagine his family going through the usual evening activities: reading, study, games, conversation, coming into a dark house from the garage, or saying good night to departing guests. In general, each room should have a light switch just inside the door, on the same side as the door-knob. Lamp outlets that may be controlled by a remote switch are now on the market.

The varied uses of the living room call for a flexible lighting plan. It should be possible to have either the relatively small amount of light needed for talking with callers, or the higher level of light required for reading or sewing. A reading lamp close to each armchair and sofa makes it possible for each member of the family to read in comfort. A lamp on a table between two chairs does double duty. If

the room contains a piano and a writing desk, additional lights are needed. Lamp outlets should be numerous, so that each lamp may be plugged in close to the place where it is used. Long, trailing lamp cords are unsightly and hazardous. Double wall outlets in 6- to 8-foot intervals about the room provide a reasonable number of attachments for lights. Closer spacing may be obtained by the use of strips with plug-in provision every 6 inches; it is also possible to install a pair of continuous grooves in the baseboard in which plugs may be inserted at any point. Appliance outlets for radio, electric fan, and vacuum cleaner should be provided in the living room.

If the dining room is used only for eating meals, a light of fairly low intensity over the table is sufficient. For best appearance, a light fixture hanging from the ceiling should be in the center of the room and above the center of the table. If the table cannot be placed in the center of the room, an inconspicuous fixture close to the ceiling, or a recessed light set into the ceiling would be better than a hanging light. If the dining table is used for games or study in the evening, a stronger light than that used for dining must be available. The dining rooms should have appliance outlets for electric fan, vacuum cleaner, toaster, waffle iron, and other accessories.

The lone ceiling fixture too often found in kitchens causes the housewife to work in her own shadow at sink, range, or work table. Adequate lighting for the kitchen should include, in addition to a semi-indirect central ceiling fixture, a shaded light over each working area. Soffit lights on the under side of cupboards are completely out of sight of the worker, and are, therefore, free from glare.

If an electric range is used, special wiring is required. Appliance outlets for the refrigerator, and for mixer, toaster, and other small electric equipment should be provided where each is to be used. If a breakfast table is located in the kitchen or in an alcove, an outlet for toaster and coffee pot should be provided near by.

In a bedroom, light of fairly strong intensity is needed at each mirror used for dressing. For those who enjoy reading in bed, a bracket lamp of approved design may be placed over the head of the bed. An

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appliance outlet for an electric heating pad should be placed near the bed. This outlet may also serve for vacuum cleaner and electric fan.

In a small bathroom, lights at each side of the mirror will provide enough light for the entire room. A larger room that is used for dressing may need additional lights. Appliance outlets for an electric heater, a fan, and other equipment should be provided. It is important that switches and outlets be located out of reach of the tub, for a faulty connection may cause death if one touches it while in contact with water.

Porches and terraces should be wired according to their use. A light switch at the house door and outlets for lamps should be provided if a porch is used as a summer living room. If it is also used for dining, appliance outlets for toaster and coffee pot make for convenience. Outdoor wiring, in general, should provide a light at every entrance, so placed that the steps are illuminated, and a light for the path from the house to the garage. Inside the garage, a light near the engine is useful for emergency repairs. Garden enthusiasts who find the daylight hours too short for enjoying their gardens are using outdoor lighting to illuminate pools, garden statuary, or unusually beautiful planting. Such lighting involves the use of special waterproof wiring.

Modern standards of lighting set up certain requirements with regard to the quantity (or intensity) and the quality of light. The unit of measure for quantity is the foot-candle, or the amount of light falling on a surface 1 foot away from a standard candle. The eye is a poor judge of lighting intensities, but power companies and dealers in electrical equipment will lend light meters to anyone who wishes to determine the amount of light in each room of his house. A light meter consists of a photoelectric cell and a scale and pointer to indicate the intensity of light falling on the cell.

The amount of light needed varies with the type of seeing expected of the eyes. More light is needed for prolonged reading or fine sewing than for less exacting tasks, such as kitchen work or a game of table tennis. According to recommendations of the Illuminating Engineering Society, from 2 to 5 foot-candles are enough for ordinary

seeing, from 5 to 10 for kitchen work and similar tasks, and from 10 to 20 for ordinary reading and sewing. Prolonged use of the eyes for reading or other close work calls for intensities of from 20 to 100 foot-candles, according to the task which the eyes are to perform. Other factors influence the amount of light needed. "One of the most outstanding facts with reference to the intensity of the illumination is the wide variation that is found in the amount of light needed and preferred for different types of work, for persons of different ages, and for different persons doing the same work in the same age group."¹

The quality of light is just as important as the quantity. Light of a desirable quality is soft, well diffused, free from glare and from sharp contrasts of light and dark. Glare, the greatest enemy of good lighting, is caused by uncovered, or insufficiently covered, light bulbs, and by the reflection of light from shiny surfaces. Ferree and Rand state that individuals differ in their susceptibility to glare. Glare may be avoided, or at least be greatly reduced, by covering all light sources so that the eye will not come in contact with too strong a light, and by the use of dull-surfaced ceiling, walls, and woodwork. To reduce glare, light sources should be behind, rather than in front of, the worker. Sharp contrasts of intensity may be avoided by distributing the light throughout the room. It is recommended that the intensity of light in the darkest parts of the room should not be less than 10 per cent of that in the brightest area.

Methods of lighting may be classified in three groups: direct lighting, in which all of the light comes directly from the source through a translucent container of glass or plastic; indirect lighting, in which all of the light is thrown to the ceiling, to be reflected downward throughout the room; and the combination method, which furnishes both direct and indirect light.

Direct lighting is likely to produce too great a contrast of intensity between lighted areas and the darker parts of the room; that is, a direct light shining on a desk or the pages of a book may provide enough light in that particular spot, but will not throw out enough

¹ FERREE, C. E., and G. RAND. Examination and Care of the Eyes in Relation to Lighting. *Archives of Ophthalmology*. January, 1937.

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light to illuminate the room as a whole. The eye automatically tries to adjust itself at the same time to the brightly lighted page and to the darker areas in the outer edges of the field of vision. Conflict in adjustment results in eyestrain.

Indirect light produces an evenly distributed, glareless light, practically free from shadows. Very light ceilings are necessary for



FIG. 143.—An example of modern lighting. (Courtesy of *House Beautiful*; photograph by Randt.)

the success of indirect lighting. White or light-ivory ceilings will reflect about 80 per cent of the light thrown on them; light gray and other light colors reflect from 50 to 70 per cent; while dark colors, such as red, brown, and blue, reflect only about 20 per cent. It is easy to see that a dark ceiling is worthless for indirect or combination lighting fixtures. A very high ceiling also reduces the effectiveness of indirect lighting. While the color of the walls is less important than that of the ceiling, light walls are better than dark ones for artif-

cial lighting, whatever method is used, for they help in distributing light through the room. If totally indirect light is used for reading or other close work, the ceiling must be extremely bright in order to produce 20-foot-candles at the level of reading or work.

An example of the combination method of lighting may be found in the portable lamps made according to the specifications of the Illuminating Engineering Society. Part of the light is direct, coming downward through a translucent glass bowl, which greatly reduces glare, and part is thrown upward to be reflected down by the ceiling. The shade is specially lined to reflect and diffuse the light, but the outside of the shade is heavy enough to shield the eyes from the light source. Other glareless lighting fixtures employ a combination of direct and indirect light, with part of the light directed downward through conical concentric ring louvers, to give local high intensity lighting, while the remainder of the light is reflected upward to provide general indirect illumination.

After the wiring of a new house has been decided on, the owner and the architect visit showrooms and study catalogues in their search for the right fixtures for each room. A double problem is involved in this search. The fixture should furnish light of the proper quality and intensity, and at the same time should be pleasant to look at. The number of fixtures on the market that fulfill these requirements is steadily increasing, but there are still many old-fashioned and inadequate fixtures, to be avoided.

The development of good lighting for the home has in the past been hindered by the belief that fixtures should serve as vehicles for ornament and for the display of wealth. Fixture catalogues of a few years ago showed a profusion of crystal drops, polychrome decoration, and highly involved wrought-iron forms. Large expenditures for chandeliers seemed to be related to social eminence. It is easy to see that, if a designer is preoccupied with the problem of crowding ornament on a fixture, he is likely to forget its chief reason for being, namely, to furnish good lighting.

Popular interest in period furnishings may also be blamed for some of the faults of home lighting fixtures. The notion has somehow

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developed that they should "match" the furniture and background of the room. Hence, the wall brackets and ceiling lights with electric bulbs sitting on oil lamps or on imitation candles. The incandescent bulb is entirely different from the candle and the oil lamp. It is scarcely possible to design a good electric light and at the same time make it look like an old-fashioned oil lamp or a candleholder. To try to do so is about as sensible as to design an electric range that looks like an old colonial fireplace. A light fixture is a utility; its function is to furnish good light. Unless one is intent on making a house into a museum of period furnishings, the idea of modern lighting devices in the same room with colonial or old English style furniture is not distasteful. After all, there is no such thing as a period *electric* light fixture. We know what the designers of the past did with candleholders and lamps, but we have no way of knowing what they would have done with electric light. If a room is to be furnished in Louis XV style, where would one go to find authentic Louis XV electric light fixtures?

Because the electric bulb is entirely different from the candle and the lamp, it is free from most of their limitations. Bulbs may be used in many places where an open flame would be a fire hazard. They may be concealed behind cornices and window frames, or recessed in walls and ceilings (see Fig. 143), or set beneath a ground-glass cover in mantels, window sills, or the tops of furniture pieces. The extreme brightness of electric bulbs is the cause of their chief limitation. We know better than to look directly at the sun; looking at a light bulb is harmful to the eyes in the same way, but to a smaller degree. In choosing light fixtures, then, the homeowner may safely decide not to buy one that lets him see the bulb from any position of normal use. Metal, translucent glass, plastic, or parchment are used to shield the eyes from light sources. The tendency today is toward extreme simplicity in the design of the fixture. Ornament is used sparingly, and is always subordinate to the proper functioning of the light. The term "fixture," in fact, can scarcely be applied to cove and recessed lights, for in these uses, the lighting is a part of the architectural structure of the room.

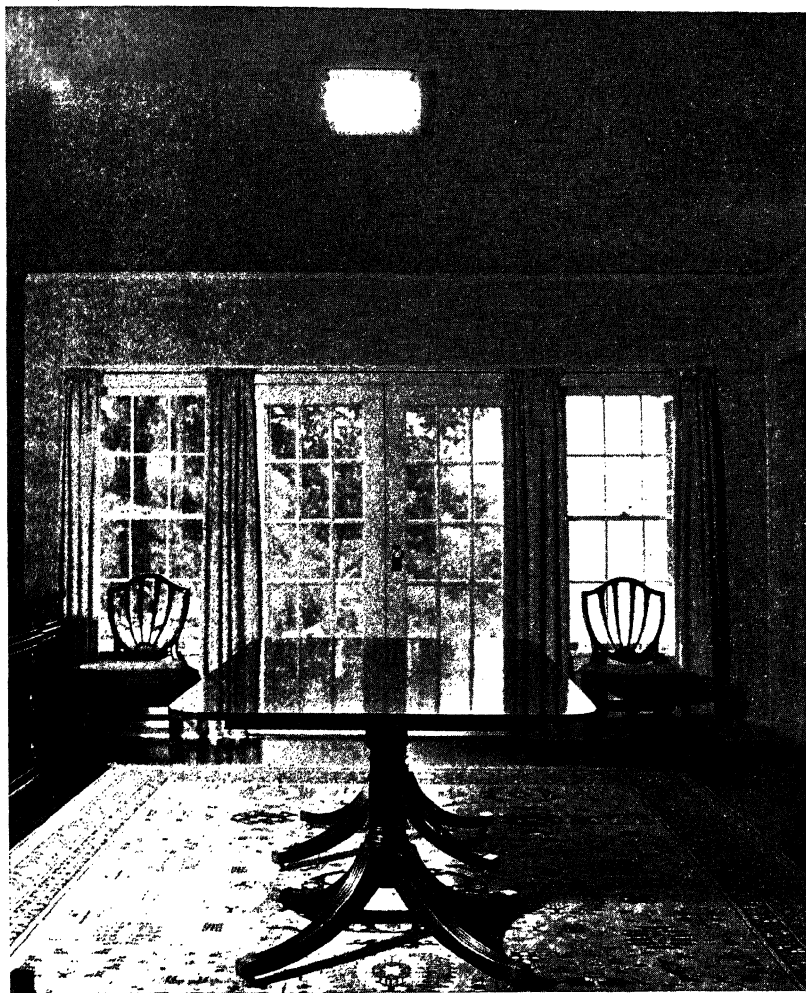


FIG. 144.—A modern recessed light fixture in the ceiling is used successfully with period furniture in this dining room. It furnishes enough light for dining, and is scarcely noticeable when candles are used on the table. (*Alexander Linn, architect.*)

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Recent developments in lighting indicate that fluorescent lights will be used in the future for home lighting. At the moment of writing, however, these lights are still in the experimental stage.

The choice of direct, indirect, or combination lighting depends on the personal preferences of the owner and on the particular problem offered by each room. Whether to use ceiling lights, table or floor lamps, or other forms, is also a decision that rests with the owner. A few hours spent in studying the subject of good lighting is repaid many times over in comfort and satisfaction after the house is in use.

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